



PROJECT MANUAL

Kitchen and Performing Arts Expansion Project

100% Construction Documents

Catalina Foothills School District
Catalina Foothills High School
Tucson, Arizona

NTD Architecture Project Number #2010-0138-00 / 2010-0323-00

April 8, 2011



PROJECT MANUAL
for the Construction
of
Kitchen and Performing Arts Expansion
for
Catalina Foothills School District
Catalina Foothills High School

Prepared By
NTD Architecture
2940 North Swan Road, Suite 214
Tucson, AZ 85712

NTD # 2010-0138-00 / 2010-0323-00

April 8, 2011

Architect

NTD Architecture
2940 N Swan Road
Suite 214
Tucson, AZ 85712



EXPIRES 03-31-2014

Structural Engineer

Holben Martin and White
2950 N Country Club Avenue
Tucson, AZ 85716



Expires 12-31-13

Mechanical/Plumbing Engineer

Adams & Associates
4067 East Grant Rd. #200
Tucson, Arizona 85712-2566



EXPIRES: 12-31-12

Electrical Engineer

Bowden Engineering
7337 East Tanque Verde Road
Tucson, Arizona 85715-3475



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PROJECT

Kitchen and Performing Arts Expansion
NTD Project No. 2010-0138-00 / 2010-0323-00

OWNER

Catalina Foothills School District
2101 East River Road
Tucson, AZ 85718-6597

ARCHITECT

NTD Architects
2940 North Swan Road, Suite 214
Tucson, AZ 85712
(520) 784-0975
(520) 784-0964 FAX

CONSULTANTS

STRUCTURAL

Holben, Martin & White
2950 North Country Club Road
Tucson, Arizona 85716
(520) 327-9491

MECHANICAL/PLUMBING

Adams & Associates
4067 East Grant Rd. #200
Tucson, Arizona 85712-2566
(520) 323-3858

ELECTRICAL

Bowden Engineering
7337 East Tanque Verde Road
Tucson, Arizona 85715-3475
(520) 326-8020



2101 E. River Road
Tucson, AZ 85718

CATALINA FOOTHILLS SCHOOL DISTRICT #16 NOTICE OF INVITATION FOR BIDS

Material and/or Service: **IFB #11-07-11 CFHS Kitchen/Performing Arts Expansion Project**

Bid DUE DATE: **Monday, May 2, 2011**

Time: **2:15 p.m. Local Time**

Opening Location: **Catalina Foothills Unified School District Office
2101 E. River Road
Tucson, AZ 85718**

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 Catalina Foothills School District, at the above specified location, until the time and date cited. Bids received by the correct time and date shall be opened and the amounts from vendors submitting bids 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 520-209-7500.

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 Bidder's name and address clearly indicated on the envelope. All Bids must be written legibly in ink or typewritten. Additional instructions for preparing a Bid are provided herein.

**Pre Bid Meeting: April 18, 2011 9:00 AM Location: Catalina Foothills High School (Maintenance Bldg)
4300 E. Sunrise Drive, Tucson AZ 85718**

Full Bid documents may be reviewed **online** at Catalina Foothills District website: www.cfsd16.org. to access as follows: Select: Administrative Services; then Financial Services, then click on appropriate bid number.

It shall be mandatory on the contractor to whom the Contract is awarded, and upon any Subcontractor under him, to comply in every respect with the applicable provisions of the Arizona Revised Statutes and with all other requirements of the laws of Arizona applicable to contracts for the construction of public works for school districts.

Bids will be opened publicly at the District Office, 2101 E. River Road, Tucson, Arizona on May 2, 2011 at 2:18 pm(Arizona time).

Procurement Specialist: Sandy Burnette
Phone: 520-209-7523
Fax: 520-209-7571
Email: sburnette@cfsd16.org

Authorization: Sandra N. Thompson
Sandra N. Thompson, Director of Finance

4/12/11
Date

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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/ars/ars/htm>”

School District Procurement Rules in the Arizona Administrative Code (A.A.C.) is available at “http://www.sosaz.com/public_services/Title_07/7-02.htm”

I.R.S. W-9 form (Request for Taxpayer I.D. Number) is available at “<http://ftp.fedworld.gov/pub/irs-pdf/fw9.pdf>”

DEFINITIONS OF TERMS FOR
UNIFORM INSTRUCTIONS TO BIDDERS & UNIFORM TERMS AND CONDITIONS

DEFINITION OF TERMS

Listed below are definitions of words used in the Uniform Instructions to Offerors and the Uniform Terms and Conditions.

- 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 Director of Finance 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/public entity.
- 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. ***“Director of Finance – Sandra N. Thompson”*** 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. ***“Solicitation”*** means an Request for Bids (“IFB”), a Request for Proposals (“RFP”), or a Request for Quotations (“RFQ”).
- L. ***“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.
- M. ***“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.

- N. **“School District/Public Entity”** means the School District/public entity that executes the Contract.

UNIFORM INSTRUCTIONS TO BIDDERS

- A. Directions for Submitting Bids** A bidder shall submit an offer on a signed original hard copy on the forms provided in this solicitation. If this document is not properly signed, the bid may be considered non-responsive. Telephoned, telegraphed, emailed, or faxed bids are not acceptable.

In the event that no bid is to be submitted, please advise the Catalina Foothills Unified School District, Purchasing Department, whether or not further invitations for like items covered by this solicitation are desired. Any bidder not responding to two (2) consecutive Invitation for Bids for similar procurements may be removed from the Bidders List for those items. A “No Response” will be considered a response.

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.

The submission of a bid shall indicate that the bidder has read the terms and conditions, understands the requirements and that the bidder can supply the required personnel, equipment and services.

No alterations, erasures or additions are to be made unless initialed in ink. Bids must be legible, typewritten if possible. Illegible or vague bids may be rejected.

Failure to examine any specifications and/or instructions will be at bidder’s risk.

In case of error in the extension of prices in the bid, unit price shall govern.

The District reserves the right to return any equipment/products/supplies which do not meet the specifications indicated in the Invitation for Bid at the bidder’s expense. The bidder guarantees that equipment and/or supplies are standard, new and regular stock.

- B. List of Subcontractors and Material Vendors** For use by the District to determine competency and capability of those working on project and quality and workmanship of those who will supply material to project. Each bidder is required to submit with his bid a list naming the Subcontractors who will be used in performing the work. The list shall include any Subcontractor that might be used in the event any or all of the various alternates are chosen by the District. The circumstances under which each Subcontractor will be used must be specifically set forth by identifying alternates for which a particular Subcontractor would be used.

ONE, and only one, Subcontractor shall be submitted for each portion of the Work for the Bid. The listing of more than one Subcontractor for any separate portion of the work shall be considered grounds for rejection of the bid by the District at the District's sole discretion.

The list shall be filled out and enclosed in a separate, opaque, sealed envelope bearing the title "List of Subcontractors" and name of the bidder, the envelope then inserted in the general bid envelope with the other forms. The list submitted by the successful bidder will be privately opened and will be retained by the District for record as a part of the Proposal. The lists of other bidders will be returned unopened.

No Subcontractor not named in such list and approved by the District may be employed on the District's Project without express written permission of the District, notwithstanding any other provision of the Contract Documents, which may be interpreted to the contrary. Should a change in the approved list become necessary in the opinion of the successful bidder, a written request shall be submitted to the District stating the reason for the change, and written approval of the District must be obtained before such change is made. This provision shall apply to work listed to be performed by the bidder as well as work listed to be performed by vendors or subcontractors.

By this requirement of a List of Subcontractors, the District does not establish any contractual relation between the District and any Subcontractor, nor will the District inquire into contractual or other relations of the bidder with any Subcontractor, nor does this list establish limits to the contracts between the bidder and any Subcontractor. The sole purpose and function of such requirement is set forth in the first sentence of the first paragraph of this section.

If prior to the signing of the Contract the District has a reasonable objection to any person or organization on the List of Subcontractors, the Consultant shall notify the apparent successful bidder in writing of such objection. Failure of the District to make an objection to any person or organization on the list prior to the award shall constitute acceptance of such person or organization except in the case where a Subcontractor is later found not to be qualified by law.

If, prior to the signing of the Contract, regardless of whether the District has evidenced any intention to award the Contract to Contractor or not, the District has a reasonable and substantial objection to any person or organization on such list, and refuses in writing to accept such person or organization except where such refusal is a result of the failure of a Subcontractor to qualify by law, the apparent successful bidder may, prior to the signing, withdraw his bid without forfeiture of bid security. If the bidder submits an acceptable substitute with an increase in his bid price to cover the difference in cost occasioned by such substitution before the actual contract signing, the District may, at his discretion, accept the increased bid price or he may disqualify the bid.

C. Bidder Certification By submission of this proposal, the bidder certifies that: (1) the bidder has not paid nor agreed to pay any person, other than a bona fide employee, a fee or brokerage resulting from the award of this contract; (2) the prices in this proposal 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 bidder.

D. Offer and Acceptance Form The Offer and Acceptance form within the Solicitation shall be submitted with the Offer and shall include a signature by a person authorized to sign the Offer. The signature shall signify the Bidder'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 an intent to be bound, such as an original signature, shall result in rejection of the Offer.

E. Bidder's Responsibility It shall be the bidder's responsibility to ensure compliance with this Invitation for Bid to include completion of all information as requested: inclusion of descriptive literature as required, compliance with all general conditions, provision of samples for evaluation within the specified time frame, and any other information or service which may be required for proper evaluation of BID response. Failure to comply with any requirement of this Invitation for Bid may result in rejection of response.

F. Form of Contract It shall be understood by the bidder and the District that the bid received is a signed agreement to furnish all goods and perform all services, including labor (if any), as stipulated in the documents, upon the award of the bid. The District may issue a numbered purchase order, which will serve as an additional Contractual Agreement with the successful bidder.

The two (2) documents (the original response bearing the signature of the bidder and the District's signed purchase order) become the forms of Contractual Agreement, agreeing to the performance of all conditions set forth in the solicitation, the standard conditions and special instructions and conditions, including any addenda issued by the solicitation.

If a firm submitting a bid requires that an additional contract be signed by the District, a copy of the proposed contract must be included with the bid. Proposed bidder contract documents will be reviewed by the District. A bidder's contract document shall not become part of the purchase contract unless and until it is signed by an authorized representative of the District. The District's contract documents shall govern in the event of conflict with the terms of a bidder's contract. No contract exists on the part of the District until a written purchase order is issued. A signed and executed Offer and Acceptance Form will be considered sufficient notice of acceptance of contract. The Contract may be modified only through a written Contract Amendment agreed to and signed by both parties.

G. Public Record Pursuant to Arizona Department of Education School District Procurement Rules (Arizona Administrative Code, R7-2-1005), all bids shall be open for public inspection after contract award, except to the extent the bidder designates, and the District concurs, that trade secrets or other proprietary data contained in the documents remain confidential. If the bidder designates a portion of their as confidential, bidder shall isolate and identify in writing the confidential portion(s) at the time of submission. The District shall make a determination prior to contract award on whether the designated information is confidential.

H. Withdrawal of Bids Any bid may be withdrawn by the bidder at any time prior to the date and time set for the bid opening. After the date and time set for bid opening, no may be withdrawn for a period of sixty (60) days, except as allowed in R7-2-1030.

I. Tax Requirements Do not include any Sales or Use Tax on individual items in this bid. Indicate the percent of tax to be charged by you on the Offer and Acceptance Page of this document. The District is not exempt from paying Sales and/or Use Tax. Use Tax will be paid on any item on which Sales Tax has not been paid. The District is exempt from paying Federal Excise Tax.

J. General Information Any formal written protest arising from the solicitation and/or award of this Invitation for Bid shall be filed with Sandra N. Thompson, Director of Finance, Catalina Foothills Unified School District No. 16, 2101 E. River Road, Tucson, AZ, the District Representative. Written protests relating to the initial solicitation must be filed with the District Representative prior to bid opening. All other protests must be filed within ten (10) days after the protester knows or should have known the basis of the protest, whichever is earlier. Contact with the District Representative may be made at (520) 209-7500 for the information required in the filing of a formal written protest pursuant to State Board of Education School District Procurement Rule R7-2-1142. Arizona Department of Education School District Procurement Rules (Arizona Administrative Code, R7-2-1001 through R7-2-1195) can be found at http://www.azsos.gov/public_services/Title_07/7-02.htm#Article_10.

K. Bidder Certification By submission of this proposal, the bidder certifies that: (1) the bidder has not paid nor agreed to pay any person, other than a bona fide employee, a fee or brokerage resulting from the award of this contract; (2) the prices in this proposal 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.

This Invitation for Bid is issued in accordance with the requirements of the Arizona Department of Education School District Procurement Rules (Arizona Administrative Code, R7-2-1001 through R7-2-1195). Any contract awarded as a result of this Invitation for Bid shall be governed by said rules.

The District reserves the right to accept or reject any bid, or any part thereof, unless specified otherwise, and to waive any minor informalities in any bid deemed by us to be in the best interest of the District.

The successful bidder shall be prepared to enter into a contract with the District within ten (10) days after notice of intent to award.

The successful bidder shall be responsible for all permits, fees or charges necessary and incidental to the lawful conduct of its business. The successful bidder shall remain fully informed of and in compliance with all ordinances and regulations pertaining to the provision of services under the contract.

In the event of a conflict in the provisions of the contract as accepted by the District, the following order of precedence shall prevail: (1) Special Terms and Conditions, (2) Standard Terms and Conditions, (3) Specifications or Scope of Work, (4) Attachments and Exhibits, (5) Documents referenced or included in the solicitation.

UNIFORM TERMS & CONDITIONS

1. CONTRACT INTERPRETATION

- A. Arizona Law. The law of Arizona (without regard to conflict of law principles) 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. Contract Order of Preference. In the event of a conflict in the provisions of the Contract, the following shall prevail in the order set forth below:
 - 1. Special Terms and Conditions;
 - 2. Uniform Terms and Conditions;
 - 3. Statement or Scope of Work;
 - 4. Specifications;
 - 5. Attachments;
 - 6. Exhibits;
 - 7. Documents referenced or included in the Solicitation.
- D. Relationship of Parties. The Contractor under this Contract is an independent Contractor. Neither party to this Contract shall be deemed to be the employee or agent of the other party to the Contract.
- E. 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.
- F. 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.
- G. 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 by the District 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 and all other applicable Federal and State laws, rules and regulations, including the Americans with Disabilities Act.
- C. Audit. Pursuant to ARS § 35-214, 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/public entity and, where applicable, the Federal Government, to 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/public entity 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/public entity determines non-compliance of the materials, the Contractor shall be responsible for the payment of all costs incurred by the School District/public entity for testing and inspection.
- E. Notices. Notices to the Contractor required by this Contract shall be made by the School District/public entity 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/Public entity 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/Public Entity. Any materials, including reports, computer programs and other deliverables, created under this Contract are the sole property of the School District/public entity. 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/public entity.

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/public entity within thirty (30) days. *The Purchase Order number must be referenced on the invoice.*
- B. Delivery. Unless stated otherwise in the Contract, all prices shall be F.O.B. destination and shall include delivery and unloading at the destinations.

C. Applicable Taxes.

1. Payment of Taxes by the School District/Public Entity. The School District/public entity will pay only the rate and/or amount of taxes identified in the Offer and in any resulting Contract.
2. State and Local Transaction Privilege Taxes. The School District/public entity 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/public entity 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. I.R.S. 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/public entity.

- D. 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/public entity 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/public entity 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 unless otherwise permitted by the Special Terms and Conditions. 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 of the Contract and of 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 Procurement Officer. The school district/public entity shall not unreasonably withhold approval.

5. RISK & 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. To the extent permitted by A.R.S. § 41-621 and § 35-154, the School District/public entity shall be indemnified and held harmless by the Contractor for its vicarious liability as result of entering into this Contract. Each party to this Contract is responsible for its own negligence.
- C. Indemnification - Patent and Copyright. To the extent permitted by A.R.S. § 41-621 and § 35-154, the Contractor shall indemnify and hold harmless the School District/public entity 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/public entity of materials furnished or work performed under this Contract. The School District/public entity 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, 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/public entity 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 two years after acceptance by the School District/public entity 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 quantity 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/public entity shall fully conform to all requirements of the Contract 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 or testing of or payment for the materials or services by the School District/public entity.
- E. Exclusions. Except as otherwise set forth in this Contract, there are no express or implied warranties or merchant ability or 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 Contractor shall maintain all applicable license and permit requirements.
- 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/public entity 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 school district/public entity 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/PUBLIC ENTITY'S CONTRACTUAL REMEDIES

- A. Right to Assurance. If the School District/public entity in good faith has reason to believe that the Contractor does not intend to, or is unable to perform or continue

performing under this Contract, the Procurement Officer may demand in writing that the Contractor give a written assurance of intent to perform. Failure by the Contractor to provide written assurance within the number of days specified in the demand may, at the School District/public entity's option, be the basis for terminating the Contract under the Uniform Terms and Conditions.

B. Stop Work Order.

1. The School District/public entity 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 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/public entity 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/public entity 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 of Offset. The School District/public entity shall be entitled to offset against any sums due the Contractor, any expenses or costs incurred by the School District/public entity or damages assessed by the School District/public entity concerning the Contractor's nonconforming performance or failure to perform the Contract, including expenses, costs and damages described in the Uniform Terms and Conditions.

8. CONTRACT TERMINATION

A. Cancellation for Conflict of Interest. Per A.R.S. 38-511 the School District/public entity 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/public entity 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/public entity may, by written notice, terminate this Contract, in whole or in part, if the School District/public entity 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/public entity 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/public entity, 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/public entity may, by written notice to the Contractor, immediately terminate this Contract if the school District/public entity 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/public entity reserves the right to terminate the Contract, in whole or in part at any time, when in the best interests of the School District/public entity 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/public entity. 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/public entity. 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/public entity 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 goods, materials, documents, data and reports prepared by the Contractor under the Contract shall become the property of and be delivered to the School District/public entity on demand.
 3. The School District/public entity 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/public entity for any excess costs incurred by the School District/public entity in procuring materials or services in substitution for those due from the Contractor.
- 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.

SPECIAL TERMS AND CONDITIONS

1. PURPOSE

The intent of this Invitation for Bids is to solicit qualified vendors to expand the Catalina Foothills High School Kitchen and Performing Arts Center located at 4300 E. Sunrise Drive, Tucson Arizona, 85718.

A. Insurance

Bidder agrees to maintain such insurance as will fully protect Bidder 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 Bidder, its employees, or by anyone directly or indirectly engaged or employed by Bidder. Bidder agrees to maintain such automobile liability insurance as will fully protect Bidder 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 Bidder or its employees, while providing services to the District.

B. Safety

Bidder, at its own expense and at all times, shall take all reasonable precautions to protect persons and the District property from damage, loss or injury resulting from the activities of Bidder, its employees, its subcontractors, and/or other persons present. Bidder will comply with all specific job safety requirements promulgated by any governmental authority, including without limitation, the requirements of the Occupational Safety Health Act of 1970.

2. APPROVAL OF EQUAL ITEMS OF EQUIPMENT AND/OR MATERIALS

Products are generally specified by reference standard and/or manufacturer's name and model number or trade name. When specified only by reference standard, the bidder may select any product meeting this standard by any manufacturer. When several products or manufacturers are specified as being equally acceptable, the bidder has the option of using any product and manufacturer combination listed.

When a specific manufacturer, installer (where pre-qualification is required), trade name or material is specified, or indicated, it is to establish a standard of quality and shall not be construed as limiting competition. If the bidder desires to use other than that specified, he shall request approval of such substitution in the manner specified below:

Submittal Requirements: All requests shall contain sufficient information, descriptive brochures, drawings, performance and test data, samples or other data as is necessary for complete evaluation and shall indicate by direct comparison how the proposed substitution compares with the specified in every material respect with that specified. Each submittal shall be well marked and identified as to the type and kind of items proposed to be substituted. Submittals shall be accompanied by a written statement from the manufacturer or contractor on his letterhead certifying that the proposed substitution meets or exceeds that specified in all aspects and that it will coordinate properly with related construction. Any redesign necessitated by the substitution shall be paid for by the Contractor.

3. ACCEPTANCE OR REJECTION OF BIDS

Catalina Foothills Unified School District reserves the right to reject any or all bids and to waive any informalities in the Bids received. The award of the Contract, if made by the District, will be made to the responsible and qualified bidder submitting the lowest, but the District shall determine in its own discretion whether a bidder is responsible and qualified to perform the Contract, what is the lowest, and whether it is in the interest of the District to accept the bid

4. EVALUATION SCHEDULE

The bids will be initially evaluated for conforming to the requirements of the IFB, and then listed according to price.

5. AWARD BASIS

The Catalina Foothills Unified School District reserves the right to award the contract determined to be in the best interest of the District. Any deviation from the general terms and conditions or exceptions taken shall be described fully and appended to the bid form on the vendor's letterhead over the signature of the person signing the bid form. Such appendages shall be considered part of the vendor's formal bid. For the absence of any statements of deviation or exception, the bid shall be accepted as in strict compliance with all terms and conditions. If a vendor receives a contract award and is unable to meet the services requirements or is unable to hold bid price, or fails to provide acceptable service as determined by the District, the District reserves the right to go to the next lowest bid.

6. BILLING

All invoices shall be submitted to the attention of: Accounts Payable, 2101 E. River Road, Tucson, AZ 85718. All invoices shall identify the specific item(s) being billed. Any purchase order issued by Catalina Foothills Unified School District will refer to the IFB number of this Bid.

7. 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. DO NOT include sales tax on any item in the Bid.

After initial contract term and three (3) months prior to any contract renewal, the Catalina Foothills Unified School District will review fully documented requests for price increases and may at its sole option accept any changes or cancel remaining contract. The vendor shall likewise offer any published price reduction, during the contract period, to the District concurrent with its announcement to other customers. All price adjustments will be effective upon acceptance of the CFSD Purchasing Department.

8. REGISTERED SEX OFFENDER RESTRICTION

Pursuant to this order, the named vendor agrees by acceptance of this order that no employee of the vendor or a subcontractor of the vendor, who has been adjudicated to be a registered sex offender, will perform work on District premises or equipment at any time when District students are, or are reasonably expected to be present. The vendor further agrees by acceptance of this order that a violation of this condition shall be considered a material breach and may result in a cancellation of the order at the District's discretion.

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 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.

14. FEDERAL IMMIGRATION AND NATIONALITY ACT

By submission of the offer, the Offeror warrants that both they and all proposed subcontractors are and shall remain in compliance with all federal, state and local immigration laws and regulations relating to the immigration status of their employees and that they have verified employment eligibility of each employee through the E-Verify program. The District may, at its sole discretion require evidence of compliance during the evaluation process. Should the District request evidence of compliance, the Offeror shall have 5 days from receipt of the request to supply adequate information. Failure to comply with this instruction or failure to supply requested information within the timeframe specified shall result in the offer not being considered for contract award.

15. FINGERPRINTING REQUIREMENTS

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 obtain a valid fingerprint clearance card pursuant to title 41, chapter 12, article 3.1. Alternately, the School District may fingerprint those persons or employees. A fingerprint check shall be made in accordance with A.R.S. 41-1750 and Public Law 92-5244 of all contractors, subcontractors or vendors and their employees except those who are not likely to have direct unsupervised contact with students, as determined by the School District. All costs associated with verification and any remedies are the sole responsibility of the contractor and any proposed subcontractor.

16. AWARD

It is expected that the award for this contract will be made in May 2011. However, no commitment is made to this award date. The contract shall be awarded to the most advantageous offer to the District.

SCOPE OF WORK

The purpose of this Invitation for Bid is to expand the Catalina Foothills High School Kitchen and Performing Arts Center. This project is a two part project. It includes expansion of the Performing Arts Department and expansion of the Kitchen. The Performing Arts expansion includes the conversion of an existing storage room into a new practice space for the Steel Drum Band and new space adjacent to the new practice room for the scenery shop. The kitchen expansion includes demolition of the existing dock and creating new space in the same location for food storage, offices, and a new refrigerator and freezer.

The Performing Arts component of the work will also include:

1. **Removal and disposal of existing mechanical equipment on the roof of the storage room and above the fire alarm panel room.**
2. **Removal of existing doors in the storage room.**
3. **Demolition of portion of dock, paving and landscaping. Relocation of water line.**
4. **Construction of new space for shop, dock and ramp.**
5. **New mechanical units for shop, drum room and fire alarm panel room.**
6. **New lighting and tubular skylights.**
7. **New paving.**

The Kitchen component of the work will also include:

1. **Removal and disposal of existing dock, canopy and related paving.**
2. **Construction of new space that includes food storage, offices and refrigerator/freezer.**
3. **New mechanical for new space.**
4. **New lighting and tubular skylights.**
5. **New paving.**

BID REQUIREMENTS

An original plus one additional copy of your bid must be submitted, original must be marked accordingly. The Catalina Foothills Unified School District will not assume responsibility for any costs related to the preparation or submission of the bid. In order for your bid to be considered, the following should be included:

Bid Price Sheet

Offer and Acceptance Form

Copy of Certification Certificate(s)

Signed I.R.S. W-9 Form Request for Taxpayer I.D. Number. A copy of this form may also be obtained from "<http://ftp.fedworld.gov/pub/irs-pdf/fw9.pdf>". (Unless form is already on file with CFSD School District).

Bid Proposal

In compliance with your Invitation for Bids the undersigned hereby offers to furnish the materials and perform the Work for the Owner's project described as **CFHS KITCHEN/PERFORMING ARTS EXPANSION PROJECT**, in strict accordance with the specifications, Schedules, Drawings, and all other pertinent Contract Documents, and agrees, upon written notice of acceptance of this Proposal at any time within ten (10) days after the date of opening of the bids, that he will execute the Contract in accordance with the Proposal as accepted, and give bond, sufficient surety, in the amount of one hundred percent (100%) of the Contract Amount, within five (5) days after the Contract Documents are presented for signature, for the following sums:

Base Bid: (not including tax) \$ _____

It is understood and agreed that the Work under the Contract Documents shall be commenced by the undersigned Bidder, if awarded the Contract for the Project, on the date instructed to commence Work ("Start Date") in the Notice to Proceed issued by the Owner in the manner specified in the Contract and General Conditions, and shall be Substantially Complete not later than 165 calendar days after the Start Date. If the Work is not Substantially Complete by the end of the indicated number of days ("Contract Time") then the undersigned Bidder shall pay Owner the amount of Five Hundred Dollars (\$500.00) as liquidated damages for each calendar day after the expiration of the Contract Time that the Work remains incomplete.

The undersigned Bidder hereby acknowledges receipt of the following Addenda, if any:

Addendum No.	Date
_____	_____
_____	_____
_____	_____

The Undersigned Bidder understands that the Owner reserves the right to reject any or all Bid Proposals or to waive any formality or technicality, and to determine the low bidder on the basis of the sum of the Base Bid, as determined by the Owner in its sole discretion, in any Proposal in the interest of the Owner.

Contractor's Arizona Contractor's License No(s). _____

(Official Name of Firm)

SEAL – If Bidder is a
Corporation

By _____

Title _____

(Complete Business Address)

LIST OF SUBCONTRACTORS

(To be filled out and submitted in separate sealed envelopes as a part of the Bid.)

PROJECT: CFHS KITCHEN/PERFORMING ARTS EXPANSION PROJECT

TO: Catalina Foothills Unified School District No. 16

In compliance with paragraph of the Instructions to Bidders, the undersigned submits the following names of Subcontractors to be used in performing the Work for the Project.

Contractor must indicate any changes in the Subcontractor list that would result from acceptance by the District of any combination of alternates by identifying the substitute Subcontractor to be used, along with the number of the alternate that would result in such substitution. No substitutions or deviations from this list shall be permitted without written consent of the District.

SUBCONTRACTORS OR MATERIAL VENDOR'S WORK	SUBCONTRACTOR'S NAME

SUBMITTED BY:

Contractor

By _____

Title _____

OFFER AND ACCEPTANCE

The Undersigned hereby offers and agrees to furnish the material, service or construction in compliance with all terms, conditions, specifications, and amendments in the Solicitation and any written exceptions in the offer.

Arizona Transaction (Sales) Privilege Tax License No.:

For clarification of this offer, contact:

Name: _____

Federal Employer Identification No. _____

Phone: _____

Fax: _____

Tax Rate: _____%

E-Mail: _____

Offer Company Name

Signature of Person Authorized to Sign

Address

Printed Name

City State Zip

Title

CERTIFICATION

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

1. The submission of the offer did not involve collusion or other anti-competitive practices.
2. The Bidder shall not discriminate against any employee or applicant for employment in violation of Federal Executive Order 99-4 and 2000-4 or A.R.S. §§ 41-1461 through 1465.
3. The Bidder 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.

ACCEPTANCE OF OFFER

The offer 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 Offer as accepted by the school district/public entity.

This contract shall henceforth be referred to as Contract No. _____ .

The Contractor has been cautioned not to commence any billable work or to provide any material or service under this contract until Contractor receives purchase order, contract release document, or written notice to proceed.

Awarded this _____ day of _____ 20 _____

AUTHORIZED SIGNATURE

W-9 Form (Rev. October 2007) Department of the Treasury Internal Revenue Service	Request for Taxpayer Identification Number and Certification	Give form to the requester. Do not send to the IRS.
Print or type See Specific Instructions on page 2.	Name (as shown on your income tax return)	
	Business name, if different from above	
	Check appropriate box: ☐ Individual/Sole proprietor ☐ Corporation ☐ Partnership ☐ Limited liability company. Enter the tax classification (D=disregarded entity, C=corporation, P=partnership) ▶ ☐ Exempt payee ☐ Other (see instructions) ▶	
	Address (number, street, and apt. or suite no.)	Requestor's name and address (optional)
	City, state, and ZIP code	
List account number(s) here (optional)		

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on Line 1 to avoid backup withholding. For individuals, this is your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I Instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

Note. If the account is in more than one name, see the chart on page 4 for guidelines on whose number to enter.

Social security number
or
Employer identification number

Part II Certification

Under penalties of perjury, I certify that:

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

Certification Instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the Certification, but you must provide your correct TIN. See the instructions on page 4.

Sign Here	Signature of U.S. person ▶	Date ▶

General Instructions

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

Purpose of Form

A person who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) to report, for example, income paid to you, real estate transactions, mortgage interest you paid, acquisition or abandonment of secured property, cancellation of debt, or contributions you made to an IRA.

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN to the person requesting it (the requester) and, when applicable, to:

- Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
- Certify that you are not subject to backup withholding, or
- Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income.

Note. If a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

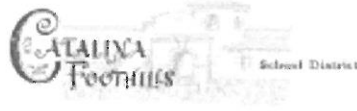
Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien,
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States,
- An estate (other than a foreign estate), or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax on any foreign partners' share of income from such business. Further, in certain cases where a Form W-9 has not been received, a partnership is required to presume that a partner is a foreign person, and pay the withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid withholding on your share of partnership income.

The person who gives Form W-9 to the partnership for purposes of establishing its U.S. status and avoiding withholding on its allocable share of net income from the partnership conducting a trade or business in the United States is in the following cases:

- The U.S. owner of a disregarded entity and not the entity,



2101 E. River Road
Tucson, AZ 85718-

“NO” RESPONSE FORM

Bid #11-07-11

CFHS KITCHEN/PERFORMING ARTS EXPANSION PROJECT

If you do not wish to bid on this solicitation, please provide written notification of your decision. Please indicate below in the appropriate area the reason for your decision and return this page. Failure to respond will result in deletion of your name from the District’s vendor listing. This form may be returned to the address listed below, or faxed to 520-209-7571. A “No” will be considered a response.

☐

I am submitting a “No” at this time.

Please keep my name on the District’s bidder’s List.

☐

I cannot meet the product/service specifications as described in the solicitation due to: _____

☐

I cannot meet the Terms and Conditions of the solicitation because: _____

☐

I do not provide services of this nature.

Please remove my name from this category. I will submit a revised Vendor Registration Form.

You may receive a copy by mail by contacting Sandy Burnette at 520-209-7523.

☐

I no longer wish to do business with Catalina Foothills Unified School District.

Please remove my name from the District’s bidder’s List.

Name of Company Proposing

Date Signed

Authorized Signature/Local Representative

Telephone/Fax Number

Type Name and Position Held with Company

Mailing Address

City

State

Zip

Please return this completed form to:
Catalina Foothills School District No. 16
Purchasing Vendor Registration
2101 E. River Road
Tucson, AZ 85718
FAX: 520-209-7571

SECTION 01 11 00
SUMMARY OF WORK

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Summary of work under this contract
- 1.1.2.** Regulatory Requirements
- 1.1.3.** Contractor use of site and premises.
- 1.1.4.** Owner occupancy.

1.2. SUMMARY OF WORK

- 1.2.1.** Work under this contract includes the following task areas, as shown on the drawings, specified in the Project Manual, and defined in the project contract documents, including but not necessarily limited to:
 - 1.2.1.1.** Demolition of certain existing improvements.
 - 1.2.1.2.** Removal and salvage of certain existing finish components, equipment and improvements.
 - 1.2.1.3.** Renovation of existing educational structures, and construction of new educational structures.
 - 1.2.1.4.** Associated site work and improvements.
- 1.2.2.** Perform all work in accordance with the requirements of the General Conditions and related Contract Documents.

1.3. REGULATORY REQUIREMENTS.

- 1.3.1.** Perform Work in accordance with the applicable codes including those indicated.
 - 1.3.1.1.** During the entire construction period, it shall be the sole responsibility of the Contractor to maintain conditions at the Project Site to meet the requirements of the Federal Occupational Safety and Health Administration (OSHA) and Arizona occupational regulations. This provision shall cover the Contractor's employees and all other persons working upon or visiting the site. The Contractor shall become fully informed of all applicable standards and regulations and inform all persons and representatives responsible for work under this Contract.
- 1.3.2.** Perform Work in accordance with the applicable provisions of local Codes and Regulations.

1.4. CONTRACTOR USE OF SITE AND PREMISES

- 1.4.1.** Contractors use of site and premises shall allow:
 - 1.4.1.1.** Work by Others and Work by Owner.

- 1.4.1.2.** Use of site and premises by public.
- 1.4.2.** Access to Site: Coordinate with Owner.
- 1.4.3.** Building Exits During Construction: Maintain all exits. Do not obstruct at any time.
- 1.4.4.** Time and Construction Schedule Considerations:
- 1.4.4.1.** Schedule all construction operations with Owner.
- 1.4.4.2.** Construction operations generating excessive noise, such as use of pneumatic tools and powder actuated fastener equipment, shall be scheduled with the Owner.
- 1.4.4.3.** Locate all noise generating equipment, such as cut-off saws, in a remote location away from administrative or classroom areas.
- 1.4.4.4.** Owner reserves the right to modify such scheduled operations to accommodate school operations or classroom programs.
- 1.4.4.5.** Provide Owner with 10 working days notice prior to commencing such operations.
- 1.4.4.6.** Construction operations, such as material deliveries, debris removal, and crane operations, shall not occur when students, staff or visitors are present at construction site. Schedule such operations around school schedule, including lunch periods. Where, in the sole opinion of the Architect, the construction site is sufficiently remote or isolated that students, staff or visitors are not exposed to such operations, construction operations may proceed as scheduled by Contractor in conformance with the Project Manual.
- 1.4.4.7.** After Owner takes beneficial occupancy of portions of project the Contractor, subcontractors and all support staff will not be allowed to enter such school facilities during hours school is in session. Where access is required to complete the work, coordinate access and scheduling with Owner's representative for non-school time.
- 1.4.4.8.** During the construction period the Contractor, subcontractors and all support staff will not be allowed to enter existing school facilities during hours school is in session. Where access is required to complete the work, coordinate access and scheduling with Owner's representative for non-school time.
- 1.4.4.9.** No interference with *classroom* or administrative activities will be permitted without approval of Owner.
- 1.4.5.** Utility Outages and Shutdown: Provide minimum 15 working days notice of any utility interruption. No deviation to the commencement nor duration of the outage or shutdown from the schedule agreed upon is allowed.
- 1.4.6.** Contractor Yard and Storage Areas: Coordinate with Owner. Coordinate location with areas required by work performed under separate contract by others. Owner will establish acceptable path for products, staging areas, and trash disposal.
- 1.4.7.** Coordinate location of all equipment parking, material and stockpile storage and construction parking with Owner.

1.5. OWNER OCCUPANCY

- 1.5.1.** The Owner will occupy the site and existing facilities during entire period of construction for the conduct of normal school and business operations.
- 1.5.2.** Cooperate with Owner to minimize conflict, and to facilitate Owner's operations.
- 1.5.3.** The Owner will occupy portions of the project as individual rooms become available for outfitting, furniture and fittings installation, and related start-up tasks.
- 1.5.4.** Adjacent Floor/Area access: Coordinate scheduling of required access to adjacent rooms and floors not included in the work of this contract. Provide minimum 15 working days notice to Owner for required access to such areas.
 - 1.5.4.1.** Do not core or drill through walls or floors into adjacent occupied areas.

1.6. FEES, BONDS, AND PERMITS

- 1.6.1.** Obtain all required permits required for work under this contract, including but not necessarily limited to the following:
 - 1.6.1.1.** Encroachment permits.
 - 1.6.1.2.** Shoring, trenching and grading permits.
- 1.6.2.** Contractor shall contact County and local agencies and arrange for all required improvement bonds, entitlement fees and County/local agency engineering fees. After submission of documentation to Owner, Owner will pay such costs. Provide Owner with notice of cost obligation as required to avoid delay in project completion.
- 1.6.3.** For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

2. PART 2 - PRODUCTS

\\Not Used

3. PART 3 - EXECUTION

\\Not Used

END OF SECTION

SECTION 01 20 00
PRICE AND PAYMENT PROCEDURES

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Schedule of Values.
- 1.1.2.** Applications for Payment.

1.2. SCHEDULE OF VALUES

- 1.2.1.** Submit typed schedule on AIA Form G703-Application and Certificate for Payment Continuation Sheet. Contractor's standard form or electronic print-out format may be considered, at Architect's discretion.
- 1.2.2.** Submit Schedule of Values per schedule defined in General Conditions.
- 1.2.3.** Provide separate schedule of values for each building, and a single schedule for site work.
- 1.2.4.** Format: Conform to the requirements of General Conditions. Identify each line item with number and title of the major specification Section. Identify site mobilization bonds and insurance.
- 1.2.5.** Revise schedule to list approved Change Orders, with each Application For Payment.
- 1.2.6.** Provide a separate line item for Contractor's overhead and profit.

1.3. APPLICATION FOR PAYMENT

- 1.3.1.** Submit three copies of each application on AIA Form G702-Application and Certificate for Payment.
- 1.3.2.** Content and Format: Utilize Schedule of Values for listing items in Application for Payment.
- 1.3.3.** Payment Period: Monthly, scheduled as defined in General Conditions.

1.4. PROGRESS PAYMENT COORDINATION

- 1.4.1.** See Section 01 77 19 for requirements and relationship between progress payment and maintenance of record drawings.
- 1.4.2.** See Section 01 33 00 for requirements and relationship between progress payment and construction schedule updates.

1.5. INSPECTOR OF RECORD PAYMENT PROVISIONS

- 1.5.1.** In the event Contractor's performance of the work activities requires the Owner's Inspector of Record to work overtime, holidays or weekends, Inspectors cost shall be reimbursed by Contractor to Owner by deductive contract adjustment.

1.6. PAYMENT FOR CONTRACT MODIFICATIONS

- 1.6.1.** The Contractor shall compensate the Owner, by Owner-Contractor Contract adjustment, for the Architect reasonable costs to modify Contract Documents required by work not performed in accordance with approved Contract Documents.

1.7. RETAINAGE

- 1.7.1.** Subject to the requirements of state law, each Application for Payment shall be subject to retainage in the amount of ten percent. The amounts so reserved will be subject to claims of liens provided by applicable state law.
- 1.7.2.** The Contractor warrants and guarantees herewith that title to all work, Materials and equipment covered by an application for payment will pass to the Owner either by incorporation in the construction or upon the receipt of payment by the Contract, whichever occurs first, free and clear of all liens, claims, security interest or encumbrances, referred to in this article as "liens"; and that no work, materials or equipment covered by an application for payment will have been acquired by the Contractor, or by any other person performing work at the site or furnishing materials and equipment for the project, subject to an agreement under which an interest of an encumbrance is retained by the seller or otherwise imposed by the Contractor or such other person.

1.8. PROGRESS PAYMENTS

- 1.8.1.** After a certificate of payment has been issued, the Owner shall make payment in the manner and within the time provided in the Contract Documents.
- 1.8.2.** The contractor shall promptly pay each subcontractor (including suppliers, laborers and material men) performing labor or furnishing material for the work upon receipt of payment from the Owner out of the amount paid to the Contractor on account of the work of such subcontractor, supplier, laborer or material man, the amount to which said subcontractor is entitled, reflecting the percentage actually retained, if any, from payments to the Contractor on account of such work. The Contractor shall, by an appropriate agreement with each subcontractor, also require each subcontractor to make payments to his sub subcontractors in a similar manner.
- 1.8.3.** The Owner may, on request, furnish to any subcontractor, if practicable, information regarding the percentages of completion or the amounts applied for the Contractor and the action taken by the Architect on account of the work done by such subcontractor.
- 1.8.4.** Neither the Owner nor the Architect shall have any obligation to pay nor to see to the payment of any monies to a subcontractor except as may otherwise be required by law.
- 1.8.5.** No certificate for a progress payment nor any progress payment nor any partial or entire use or occupancy of the project by the Owner shall constitute an acceptance of any work which is not in accordance with the Contract Documents.
- 1.8.6.** The Contractor agrees to keep the work and the site on which work is to be performed free and clear of all liens and claims of liens on materials furnished pursuant to the Contract Documents.

1.9. PAYMENTS WITHHELD

- 1.9.1.** The Architect may decline to certify payment and may withhold their certificate in whole or in part, to the extent necessary to protect the Owner, if in their opinion they are unable to make representations to the Owner as provided in this Section.

- 1.9.2.** If the Architect is unable to make representations to the Owner and to certify payment in the amount of the application, the Architect will notify the Contractor as soon as possible. If the Contractor and the Architect cannot agree on a revised amount, the Architect will promptly issue a certificate for payment in the amount for which the Architect is able to make such representations to the Owner.
- 1.9.3.** The Architect may also decline to certify payment or any part thereof or, because of subsequent observations, Architect may nullify the whole or any part of any certificate for payment previously issued, to such extent as may be necessary in their opinion to protect the Owner from loss because of the following conditions.
- 1.9.3.1.** Defective work not remedied;
 - 1.9.3.2.** Third party claims filed or reasonable evidence indicating probable filing of such claims;
 - 1.9.3.3.** Failure of the Contractor to make payments properly to subcontractors or for labor, materials or equipment;
 - 1.9.3.4.** Reasonable evidence that the work cannot be completed for the unpaid balance of the contract sum;
 - 1.9.3.5.** Damage to the Owner or another contractor;
 - 1.9.3.6.** Failure to execute the work in accordance with the Construction schedule;
 - 1.9.3.7.** Failure to provide, maintain, and update record drawings;
 - 1.9.3.8.** Reasonable evidence that the work will not be or had not been completed within the contract time;
 - 1.9.3.9.** Failure to carry out the work in accordance with the Contract Documents;
 - 1.9.3.10.** Liens filed, or reason to believe it is probable a lien will be filed for any portion of the work;
 - 1.9.3.11.** Failure or refusal of the Contractor to fully comply with Division 1.
 - 1.9.3.12.** All unit prices shall be valid and in force during the life of the Contract and shall be reconciled with the Contract Sum, in accordance with the General Conditions, before filing of the Notice of Completion.

1.10. FINAL COMPLETION AND FINAL PAYMENT

- 1.10.1.** Upon receipt of written notice from the Contractor as required in Section 01 77 19 that the work is ready for final inspection and acceptance and upon receipt of final application for payment, the Architect will promptly make such inspection, and when they find the work acceptable under the Contract Documents and the Contract fully performed, the Architect will issue a Final Certificate for Payment stating that to the best of their knowledge, information and belief, and on the basis of their observations and inspections, the work has been completed in accordance with the terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor, and noted in said final certificate, is due and payable.

- 1.10.2.** Retention of funds withheld will be released to the Contractor within 60 days of the date of completion of a work of improvement. Completion is defined as occurring when a Owner begins occupancy, beneficial use, and enjoyment of work of improvement (excluding an operation for testing, startup, or commissioning) accompanied by a cessation of labor on the work of improvement.
- 1.10.3.** Neither final payment nor the remaining retainage percentage shall become due until the work is free and clear of any and all liens and the Contractor submits to the Owner:
- 1.10.3.1.** An affidavit that all payrolls, bills for materials and equipment and other indebtedness connected with the work for which the Owner or his property might in any way be responsible, have been paid or otherwise satisfied.
- 1.10.3.2.** Consent of surety, if any, to final payment.
- 1.10.3.3.** If required by the Architect, other data establishing payment or satisfaction of all such obligations, such as receipts, releases and waivers of liens arising out of the Contractor, to the extent and in such form as may be designated by the Architect.
- 1.10.4.** If, after substantial completion of the work, final completion thereof is materially delayed through no fault of the Contractor or by the issuance of change orders affecting final completion, and the Owner so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the contract, make payment of the balance due for that portion of the work fully completed and accepted.
- 1.10.5.** The making of final payment shall constitute a waiver of all claims by the Owner against the Contractor except those arising from:
- 1.10.5.1.** Unsettled liens and claims against the Owner, the Architect, or their employees, agents or representatives;
- 1.10.5.2.** Faulty or defective work appearing after substantial completion;
- 1.10.5.3.** Failure of the work to comply with the requirements of the Contract Documents;
- 1.10.5.4.** Failure to provide fully updated and completes record drawings;
- 1.10.5.5.** Any warranties contained in or required by the Contract Documents; or
- 1.10.5.6.** Damages incurred by the Owner resulting from lawsuits brought against the Owner, the Architect, or their agents, employees or representatives because of failures or actions on the part of the Contractor, his subcontractors or sub subcontractors, or any of their employees, agents or representatives.
- 1.10.5.7.** The acceptance of final payment shall constitute a waiver of all claims by the Contractor except those previously made in writing and identified by the Contractor as unsettled at the time of the final application for payment
- 1.10.5.8.** All provisions of this Agreement, including, without limitation, those establishing obligations and procedures, shall remain in full force and effect notwithstanding the making or acceptance of final payment prior to the Date of Substantial Completion of the Project.
- 1.10.6.** PREPARATION OF APPLICATION FOR FINAL PAYMENT

- 1.10.6.1.** Fill in application form as specified for progress payments.
- 1.10.6.2.** Use continuation sheet for presenting the final statement of accounting.
- 1.10.6.3.** Administrative actions and submittals, which must precede or coincide with submittal of the final payment Application for Payment include the following:
 - 1.10.6.3.1.** Occupancy permits and similar:
 - 1.10.6.3.2.** Warranties (guarantees) and maintenance agreements.
 - 1.10.6.3.3.** Test/adjust/balance records.
 - 1.10.6.3.4.** Maintenance instructions.
 - 1.10.6.3.5.** Meter readings.
 - 1.10.6.3.6.** Start-up performance reports.
 - 1.10.6.3.7.** Change-over information related to
 - 1.10.6.3.8.** Owner's occupancy, use, operation and maintenance.
 - 1.10.6.3.9.** Final cleaning.
 - 1.10.6.3.10.** Completion of Project closeout requirements, including all reports and certifications required by Authorities Having Jurisdiction.
 - 1.10.6.3.11.** Completion of items specified for completion after Substantial Completion.
 - 1.10.6.3.12.** Assurance that unsettled claims will be settled.
 - 1.10.6.3.13.** Assurance that Work not complete and accepted will be completed without undue delay.
 - 1.10.6.3.14.** Transmittal of required Project construction records to Owner.
 - 1.10.6.3.15.** Proof that taxes, fees and similar obligations have been paid.
 - 1.10.6.3.16.** Removal of temporary facilities and services.
 - 1.10.6.3.17.** Removal of surplus materials, rubbish and similar elements.
 - 1.10.6.3.18.** Change of door locks to Owner's access.

1.10.7. UNIT PRICES

- 1.10.7.1.** Unless otherwise specified, all unit prices quoted in the Bid Form for additions to or deductions from the Work are the installed costs of products, including overhead and profit, taxes and other costs, so that they are the complete price to the Owner. These unit prices shall not apply to work which the Contractor may elect to do or not to do, for the sake of its own convenience, nor shall they apply to work required to be performed in order to correct errors committed by the Contractor.

2. PART 2 - PRODUCTS

(NOT USED)

3. PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 25 00
PRODUCT OPTIONS

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Product Options.

1.1.2. Substitutions.

1.2. PRODUCT OPTIONS

1.2.1. Products Specified by Reference Standards or by Description Only: Any Product meeting those standards or description.

1.2.2. Products Specified by Naming a Manufacturers Product: Provide Products of the lead manufacturer named in compliance with specifications.

1.2.2.1. Products of alternate manufacturers not named are considered substitutions, and may be considered by Architect, provided products provide quality and performance equal to that specified.

1.2.2.2. Where another manufacturer is listed as an approved alternate manufacturer to the specified lead manufacturer, products supplied by listed alternate manufacturer shall comply with specified characteristics of the lead manufacturer, and demonstrate compliance by providing substitution documentation as required by this Section.

1.2.2.3. Where the substituted manufacturers standard product is not equal to that specified, the substituted manufacturer shall provide custom or non-standard products, system components, fabrication and configuration as necessary to comply with specified criteria, whether or not such criteria are the substituted manufacturers standard or stock item.

1.2.2.4. Consideration of whether a substituted product is equal to that specified will include all characteristics of the specified product, based on published data available from the specified manufacturer, whether listed in the specification or not.

1.2.2.5. Consideration of whether a substituted product is equal to that specified is solely the decision of the Architect.

1.2.2.6. Provide substitution documentation as specified in this Section.

1.2.3. Where product is specified followed by term "No Substitution Permitted", or similar phrase, do not submit alternate products for review. Any substitution request received will be returned rejected.

1.3. SUBSTITUTIONS

1.3.1. Substitutions, including requests for substitution during bidding period, will be considered in accordance with the General Conditions and this Section.

- 1.3.2.** Submit all Requests for Substitutions within **25** days after Notice to Proceed. Substitutions received after the **25** day period will be rejected.
- 1.3.2.1.** Substitutions may be considered when a Product becomes unavailable through no fault of the Contractor.
- 1.3.3.** Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents and as follows.
- 1.3.3.1.** Submit each request separately, using form provided in this Section.
- 1.3.3.2.** Provide a typed, line by line comparison of the characteristics and attributes of the specified item with those of the proposed substitution. Where necessary, convert test data of the proposed substitution to the same test method of the specified item or product.
- 1.3.4.** By submitting a request, the Contractor stipulates that the Contractor:
- 1.3.4.1.** Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.
- 1.3.4.2.** Will provide the same warranty for the Substitution as for the specified Product.
- 1.3.4.3.** Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
- 1.3.4.4.** Waives claims for additional costs or time extension which may subsequently become apparent.
- 1.3.5.** Contractor agrees to compensate Architect, at Architect's current billing rates, for review of Substitution requests that require modification of the Contract Documents.
- 1.3.5.1.** Compensation shall be made by an adjustment to the Contract amount.
- 1.3.5.2.** Compensation as agreed upon shall be paid by the Contractor whether the change is approved or rejected.
- 1.3.5.3.** Where required by agency having jurisdiction, the Contractor shall pay all plan check fees or fees required to obtain approval.
- 1.3.5.4.** The Contractor shall pay the Architect and its Consultants for all services rendered for drawings, calculations, review time, for each substitute item(s) for approval.
- 1.3.6.** Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- 1.3.7.** Request for Substitution will only be considered when submitted within specified time period of Contract award, and when such request is accompanied by complete data substantiating compliance of proposed substitution with Contract Documents criteria and standard of quality.
- 1.3.8.** Substitution Submittal Procedure:

- 1.3.8.1.** Submit three copies of Request for Substitution for consideration. Limit each request to one proposed Substitution.
- 1.3.8.2.** Submit Substitution Request Form as attached, shop drawings, Product data, certified test results and other documentation required by the Architect attesting to the proposed Product equivalence.
 - 1.3.8.2.1.** Substitution requests without such documentation will be rejected without review.
- 1.3.8.3.** The Architect will notify Contractor, in writing, of decision to accept or reject request.
 - 1.3.8.3.1.** The Architect will review Substitution Request upon receipt and will request any additional data necessary to accept or reject substitution request.
 - 1.3.8.3.2.** Substitution Requests received after 9:00 AM on Friday will be logged as received on the following Monday at 8:00 AM.
 - 1.3.8.3.3.** The decision to accept or reject substitution request will be made within a reasonable period after Architect receives final documentation data.
 - 1.3.8.3.4.** Where substitution request is rejected, provide submittal for specified product within five days of receipt of notice rejection.
 - 1.3.8.3.5.** Where decision cannot be made within the time required for orderly and uninterrupted work progress, provide the specified product.
- 1.3.8.4.** A maximum of one substitution request shall be submitted for any one item.
- 1.3.8.5.** Substitutions with material effect on the project will be submitted for approval of agency having jurisdiction as a Change Order per Section 01 26 00, prior to fabrication or installation.

2. PART 2 – PRODUCTS

NOT USED

3. PART 3 – EXECUTION

NOT USED

END OF SECTION

CONTRACTOR'S SUBSTITUTION REQUEST FORM

REQUEST # _____

Contractor: _____

NTD Proj. # _____ Date: _____

To: NTD Architecture, Attn.: _____

NTD Project: _____

Reference: Drawing(s) _____ Spec Section(s) _____ Other _____

Disciplines Impacted: ☐ Structural ☐ Mechanical ☐ Electrical ☐ Architectural
 ☐ Civil ☐ Landscape ☐ Kitchen ☐ _____

By submitting substitution, Contractor stipulates the following statements are correct:

1. Proposed substitution does not alter dimensions or dimensional relationships shown on drawings.
2. The Architect's costs caused by proposed substitution will be compensated per Section 01 25 00.
3. Proposed substitution does not adversely impact schedule or coordination of work by others.
4. Proposed substitution will not adversely impact warranty requirements.
5. Proposed substitution will not adversely impact availability of service, maintenance or replacement parts.

Summary of Proposed Substitution: _____

Reason for Proposed Substitution: _____

Comparison of proposed item to specified item per Section 01 25 00:	☐ Attached	☐ Under separate cover
Name and Location of three similar applications:	☐ Attached	☐ Under separate cover
Description of required changes to the drawings and project manual:	☐ Attached	☐ Under separate cover
Description of impact on applicable code requirements:	☐ Attached	☐ Under separate cover
Name and Location of maintenance service and parts supply:	☐ Attached	☐ Under separate cover

If Substitution Request is accepted, there will be:

Possible Cost Impact	☐ Increase	☐ Decrease	☐ No Change
Possible Time Impact	☐ Increase	☐ Decrease	☐ No Change

Action on this Substitution Request is requested as soon as possible, but no later than _____ **☐ PRIORITY ATTENTION REQUIRED**

Contractor's Representative

Copies to: _____

Architect's Response:

Date: _____

☐ Accepted ☐ Accepted as noted ☐ Denied ☐ Denied: Received late

NTD Representative

Copies to: _____

Owners Representative

Copies to: _____

SECTION 01 26 00
CONTRACT MODIFICATION PROCEDURES

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Schedule of Values.
- 1.1.2.** Application for Payment.
- 1.1.3.** Change procedures.
- 1.1.4.** Request for Information Procedures.

1.2. SCHEDULE OF VALUES

- 1.2.1.** Submit typed schedule complying with the format established in this Section. Contractor's standard form or electronic print-out format may be considered, at Architects discretion.
- 1.2.2.** Submit Schedule of Values as indicated in the General Conditions and as specified.
- 1.2.3.** Identification: Include on schedule of values the following:
 - 1.2.3.1.** Project name and Location.
 - 1.2.3.2.** Name of Architect.
 - 1.2.3.3.** Architects Project Number.
 - 1.2.3.4.** Contractor's Name and Address.
 - 1.2.3.5.** Date of Submittal.
- 1.2.4.** Format: Type in tabular form with separate columns to indicate the following for each item listed.
 - 1.2.4.1.** Generic Name, using Project Manual table of contents as a content guide.
 - 1.2.4.2.** Related Specification Section.
 - 1.2.4.3.** Name of Subcontractor.
 - 1.2.4.4.** Name of manufacturer or fabricator where applicable.
 - 1.2.4.5.** Name of supplier where applicable.
 - 1.2.4.6.** Change Order amounts allocated to the line item.
 - 1.2.4.7.** Total Dollar value of item.
 - 1.2.4.8.** Percentage of Contract sum represented by item, rounded to nearest one hundredth percent, adjusted to total 100 percent.

- 1.2.5.** Correlate line items with terms and identification used in other administrative work items, including schedules, list of subcontractors, list of products and suppliers, and submittal schedule.
- 1.2.6.** Provide schedules as follows.
 - 1.2.6.1.** Where an Application for Payment may include requests for equipment, components or materials purchased, stored or fabricated, but not yet installed, provide separate line item on the Schedule of Values for such items. Breakdown such line items to include component, equipment or material cost for each phase or sequence of construction, with associated staging, transport and installation cost.
- 1.2.7.** The total of the amounts of all scheduled line items shall equal the Contract Sum. Round amounts to nearest dollar.
- 1.2.8.** Each line item shall break out the Contractor's overhead and profit for that item.
- 1.2.9.** Revise Schedule of Values to list approved Change Orders and Construction Change Directives, and submit with each Application For Payment.
- 1.2.10.** The amounts shown on Schedule of Values may be used by Owner to determine the true value for additive or deductive change orders.
- 1.2.11.** Identify each line item with number and title of the major specification Section. Identify site mobilization bonds and insurance.

1.3. INSPECTOR OF RECORD PAYMENT PROVISIONS

- 1.3.1.** In the event Contractor's performance of the work activities requires the Owner's Inspector of Record to work overtime, holidays or weekends, Inspectors cost shall be reimbursed by Contractor to Owner by deductive contract adjustment.

1.4. CHANGE PROCEDURES

- 1.4.1.** General
 - 1.4.1.1.** Contractor shall establish measures as needed to assure familiarity of the Contractor's staff and employees with procedures for processing changes to the Contract Documents.
 - 1.4.1.2.** The Contractor shall maintain and coordinate a Register of RFI's, ASI's, Contractor Change Order Requests, Construction Change Directives, and Change Orders at the job site, accurately reflecting current status of all pertinent data as submitted by the Contractor.
- 1.4.2.** Architect's Supplemental Instructions (ASI): The Architect will advise of minor changes in the Work that do not involve an adjustment to Contract Price or Contract Time by issuing supplemental instructions on AIA Form G710 or other Architect issued document.
 - 1.4.2.1.** If Contractor considers the minor change does represent a change in the Contract, Contractor shall immediately notify the Architect of Contractor's intention to make a claim.

- 1.4.3.** Proposal Request (PR): The Architect may issue a Proposal Request which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications.
- 1.4.3.1.** Analyze the described change and its impact on costs and time. Submit response within 10 days. If accepted by Owner, Architect will prepare Change Order.
 - 1.4.3.2.** When requested, meet with the Architect as required to explain costs and, when appropriate, determine other acceptable ways to achieve the desired objective.
 - 1.4.3.3.** Alert pertinent personnel and subcontractors as to the impending change and, to the maximum extent possible, avoid such work as would increase the Owner's cost for making the change, advising the Architect in writing when such avoidance no longer is practicable.
 - 1.4.3.4.** Following review, and if accepted by Owner, Architect will prepare Change Order.
- 1.4.4.** Change Order Request (COR):
- 1.4.4.1.** Contractor may submit a COR to the Architect for changes in conditions, Owner changes, or other direction from the Architect, jurisdictional authority or Owners inspector.
 - 1.4.4.2.** Document the proposed change and its complete impact, including its effect on the cost and schedule of the work.
 - 1.4.4.3.** Present total cost and schedule impacts in documentation, including all mark-ups permitted by General Conditions. Provide detailed back-up as required by Architect, including supplier costs, sub-contractor labor time and rates, and all other data deemed necessary by Architect for Owner's and Architect's review of COR.
 - 1.4.4.4.** Following final review by Architect and Owner of original and supplemental information, and if COR is accepted, no additional cost or schedule adjustments will be included.
 - 1.4.4.5.** Architect will review COR. If accepted, Architect will prepare a Change Order or Construction Change Directive.
- 1.4.5.** Change Order (CO): Change Orders and Construction Change Directives will be issued by the Architect in accordance with procedures established in General Conditions.
- 1.4.5.1.** Change Order Forms: Per attached form at end of this Section.
 - 1.4.5.2.** Execution of Change Orders: Architect will issue Change Orders for signatures of Owner, Architect, and Contractor as provided in the General Conditions of the Contract.
- 1.4.6.** Construction Change Directives (CCD): CCD will be issued by the Architect.
- 1.4.6.1.** Construction Change Directive Forms: AIA G714 Construction Change Directive Form, current edition, or other format as selected by Architect.

1.4.6.2. Execution of Construction Change Directive: Architect will issue CCD with Owners signature. Proceed with work as defined by CCD.

1.4.6.3. Unless otherwise agreed, maintain detailed records of work done under the direction of a CCD on Time and Material basis. Provide full information required to substantiate costs for changes in the Work.

1.4.6.4. Following agreement on cost of the work, a Change Order will be prepared.

1.4.7. No payment on Time and Materials basis will be made without signature of Inspector of Record certifying time spent and materials used Architect and Inspector of Record shall establish documentation and reporting procedure for Time and Material certification.

1.4.8. Architect will provide a single copy of all documents issued under this Article for transmission to Contractor. Contractor shall prepare copies as required for distribution to subcontractors, suppliers and others at no cost to Owner.

1.5. PROGRESS PAYMENT COORDINATION

1.5.1. See Section 01 77 19 for requirements and relationship between progress payment and maintenance of record drawings.

1.5.2. See Section 01 33 00 for requirements and relationship between progress payment and construction schedule updates.

1.6. APPLICATION FOR PAYMENT COORDINATION

1.6.1. Submit three copies of each application on AIA Form G702-Application and Certificate for Payment.

1.6.2. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.

1.6.3. Payment Period: Monthly.

1.7. PAYMENT FOR CONTRACT MODIFICATIONS

1.7.1. The Contractor shall compensate the Owner, by Owner-Contractor Contract adjustment, for the Architect's reasonable costs to modify Contract Documents required by work not performed in accordance with approved Contract Documents.

1.8. REQUEST FOR INFORMATION

1.8.1. The Architect will respond to legitimate and bonafide Requests for Information (RFI) initiated by Contractor.

1.8.2. Submit all RFI's on attached form. Use of Contractors form will not be accepted. RFI's submitted by subcontractors or suppliers will not be reviewed.

1.8.3. The Contractor shall compensate the Architect, by Owner-Contractor Contract adjustment, for the Architect's reasonable costs to respond to RFI's if the Architect determines:

1.8.3.1. The RFI does not reflect careful study and review of the documents, or;

1.8.3.2. Demonstrates a lack of knowledge or construction competency reasonably expected of a Contractor performing the work.

- 1.8.4.** The Architect's action will be taken with such reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review.
- 1.8.5.** RFI's received in Architects office after 9:00 AM Friday will be logged in as received by Architect on Monday, 8:00 AM. This applies to all forms of communication, including RFI's arriving via FAX transmission.

2. PART 2 - PRODUCTS

\\Not Used

3. PART 3 - EXECUTION

\\Not Used

END OF SECTION

CONTRACTOR'S REQUEST FOR INFORMATION

RFI # _____

From: _____

NTD Proj. # _____

Date: _____

To: _____

NTD Project: _____

Disciplines Impacted:	☐ Structural	☐ Mechanical	☐ Electrical	☐ Architectural
	☐ Civil	☐ Landscape	☐ Kitchen	☐ _____

Reference: Drawing(s) _____ Spec Section(s) _____ Other _____

Please clarify or provide the following information:

Possible Cost Impact	☐ Increase	☐ Decrease	☐ No Change	☐ Unknown
Possible Time Impact	☐ Increase	☐ Decrease	☐ No Change	☐ Unknown

This information is required as soon as possible,
but no later than _____

☐ **PRIORITY ATTENTION REQUIRED**

Copies to: _____

Contractor's Representative

Architect's Response: _____ Date: _____

Copies to: _____

NTD Representative

SECTION 01 31 13
PROJECT COORDINATION

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Coordination.
- 1.1.2.** *Field Engineering*
- 1.1.3.** *Cutting and Patching*
- 1.1.4.** Preconstruction conference.
- 1.1.5.** Progress meetings.
- 1.1.6.** Preinstallation conferences.

1.2. COORDINATION

- 1.2.1.** Contractor shall comply with the following project start-up and administrative requirements for work under the Contract:
 - 1.2.1.1.** Coordinate the work and work of subcontractors with work by others under separate contract on Project.
 - 1.2.1.2.** Establish procedures for the orderly progress and prosecution of the work, including, but not limited to, attendance at project meetings, communication and documentation procedures, submittal processing, and control of the site.
 - 1.2.1.3.** Coordinate work with all inspection and testing, including compliance with all agency inspection criteria.
 - 1.2.1.4.** Coordinate and monitor use of temporary utilities, conserving energy where feasible.
 - 1.2.1.5.** Prepare detailed schedule for all subcontractors in compliance with Section 01 33 00 *and* Section 01 32 16. Coordinate scheduling of work, submittals, and inspection/testing to assure the efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later. Monitor schedules for compliance with completion dates, modify and recommend adjustments. Manage subcontractors work, including monitoring of work force, work completed and impact on schedule
 - 1.2.1.6.** Coordinate completion and clean up the Work in preparation for Substantial Completion and for portions of Work designated for Owner's partial occupancy.
 - 1.2.1.7.** After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.2.2. Contractor shall comply with the following requirements for coordinating the Work:

- 1.2.2.1.** Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- 1.2.2.2.** Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- 1.2.2.3.** Unless otherwise indicated, where piping, ducts, and wiring occurs in finished areas, conceal such pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

1.3. FIELD ENGINEERING

- 1.3.1.** Provide field engineering in accordance with the General Conditions and as specified.
- 1.3.2.** Provide field engineering as required to generate Record Drawing data as specified in Section 01 77 19.
- 1.3.3.** Provide licensed Civil Engineer, currently registered in Arizona, and acceptable to the Architect. Where approved by jurisdictional authority and Architect, a licensed Land Surveyor may be acceptable.
- 1.3.4.** Maintain and protect all control datum and reference points established by Owner's survey.
- 1.3.5.** Provide field engineering services as required to implement the work in accordance with industry standards and specified tolerances. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.
- 1.3.6.** Submit a copy of registered site drawing and certificate signed by the Land Surveyor that the elevations and locations of the Work are in conformance with the Contract Documents.

1.4. CUTTING AND PATCHING

- 1.4.1.** Provide for cutting and patching in accordance with the General Conditions, as specified, or as required to implement the work of this Contract, whether shown or not.
- 1.4.2.** Employ skilled and experienced installer to perform cutting and patching.
- 1.4.3.** Submit written request 72 hours in advance of cutting or altering elements which affects:
 - 1.4.3.1.** Structural integrity of element.
 - 1.4.3.2.** Integrity of weather-exposed or moisture-resistant elements.
 - 1.4.3.3.** Efficiency, maintenance, or safety of element.
 - 1.4.3.4.** Visual qualities of sight-exposed elements.

- 1.4.4.** Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to:
 - 1.4.4.1.** Fit the several parts together, to integrate with other Work.
 - 1.4.4.2.** Uncover Work to install or correct ill-timed Work.
 - 1.4.4.3.** Remove and replace defective and non-conforming Work.
 - 1.4.4.4.** Remove samples of installed Work for testing.
 - 1.4.4.5.** Provide openings in elements of Work for penetrations of mechanical and electrical Work.
- 1.4.5.** Execute work by methods which will avoid damage to other Work, and provide proper surfaces to receive patching and finishing.
- 1.4.6.** Cut rigid materials using masonry saw or core drill unless otherwise approved by Architect.
- 1.4.7.** Restore Work with new products in accordance with requirements of Contract Documents.
- 1.4.8.** Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- 1.4.9.** Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
- 1.4.10.** Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.

1.5. PRECONSTRUCTION CONFERENCE

- 1.5.1.** Architect will schedule a conference upon execution of the Contract.
- 1.5.2.** Attendance Required: Owner, Owner's Project Inspector, Owner's Testing Service representative, Architect, Contractor and major Sub-contractors, including assigned superintendent and foreman. Obtain Architect's prior approval of major subcontractors attendance.
- 1.5.3.** Agenda:
 - 1.5.3.1.** Organizational structure of project, schedule overview and other project characteristics.
 - 1.5.3.2.** Designation of responsible staff representing the parties required for implementation of the project, including Contractor, Architect and others.
 - 1.5.3.3.** Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.
 - 1.5.3.4.** Procedures and processing of field decisions, submittals, substitutions, proposal request, Change Orders and Contract closeout procedures.
 - 1.5.3.5.** Scheduling, including coordination with work of others.
 - 1.5.3.6.** Use of premises by Owner and Contractor.

- 1.5.3.7.** Owner's requirements and partial occupancy.
- 1.5.3.8.** Construction facilities and controls provided by Owner.
- 1.5.3.9.** Temporary utilities considerations.
- 1.5.3.10.** Security and housekeeping procedures.
- 1.5.3.11.** Procedures for testing.
- 1.5.3.12.** Procedures for maintaining record documents.
- 1.5.3.13.** Requirements for start-up of equipment.
- 1.5.3.14.** Inspection and acceptance of equipment put into service during construction period.

1.6. PROGRESS MEETINGS

- 1.6.1.** Schedule and administer meetings throughout progress of the Work at approximately weekly intervals maximum.
 - 1.6.1.1.** Contractor shall assign the same staff members to represent and act on behalf of the Contractor at all progress meetings.
- 1.6.2.** Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- 1.6.3.** Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, Architect, Project Inspector and others as appropriate to agenda topics for each meeting.
- 1.6.4.** Agenda:
 - 1.6.4.1.** Review minutes of previous meetings.
 - 1.6.4.2.** Review of Work progress.
 - 1.6.4.3.** Field observations, problems, and decisions.
 - 1.6.4.4.** Identification of problems which impede planned progress.
 - 1.6.4.5.** Review of submittals schedule and status of submittals.
 - 1.6.4.6.** Review of off-site fabrication and delivery schedules.
 - 1.6.4.7.** Maintenance of progress schedule.
 - 1.6.4.8.** Corrective measures to regain projected schedules.
 - 1.6.4.9.** Planned progress during succeeding work period.
 - 1.6.4.10.** Coordination of projected progress.
 - 1.6.4.11.** Maintenance of quality and work standards.
 - 1.6.4.12.** Effect of proposed changes on progress schedule and coordination.

1.6.4.13. Other business relating to Work.

1.7. PREINSTALLATION CONFERENCES

- 1.7.1.** When required in individual specification Section, convene a pre-installation conference at work site prior to commencing work of the Section.
- 1.7.2.** Require attendance of parties directly affecting, or affected by, work of the specific Section.
- 1.7.3.** Notify Architect, Owner and Inspector of Record a minimum four (4) days in advance of meeting date.
- 1.7.4.** Prepare agenda, preside at conference, record minutes, and distribute copies within two days after conference to participants, with two copies to Architect.
- 1.7.5.** Review conditions of installation, preparation and installation procedures, and coordination with related work.

1.8. MINUTES OF MEETINGS

- 1.8.1.** Architect shall compile detailed minutes of the meetings, except pre-installation conferences, and furnish one copy to the Owner, Contractor and Inspector. Minutes shall record discussion, actions taken, and issues assigned to parties responsible for resolution.
- 1.8.2.** Recipients of minutes may make additional copies as they desire.
- 1.8.3.** Published minutes will be accepted as properly stating the activities and decision of the Meeting unless they are challenged in writing prior to the next regularly scheduled Progress Meeting.
 - 1.8.3.1.** Persons challenging published minutes are responsible to reproduce and distribute copies of challenge to all recipients of the particular minutes being challenged.
 - 1.8.3.2.** Settle challenge as priority item of 'old business' at the next regularly scheduled meeting.
- 1.8.4.** Except for pre-installation conferences, Contractor shall not prepare or distribute meeting minutes. Architect will not review or take action on any meeting minutes prepared by Contractor.

2. PART 2 - PRODUCTS

Not Used

3. PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Submittal procedures.
- 1.1.2.** *Construction progress schedules.*
- 1.1.3.** Proposed Products list.
- 1.1.4.** Deferred Approvals
- 1.1.5.** Shop drawings.
- 1.1.6.** Product data.
- 1.1.7.** Samples.
- 1.1.8.** Manufacturers' instructions.
- 1.1.9.** Manufacturers' certificates.

1.2. SUBMITTAL PROCEDURES

- 1.2.1.** Transmit required submittals to Architect per criteria in the General Conditions and as specified.
 - 1.2.1.1.** Transmit submittals within time periods established by the General Conditions and as required to maintain orderly and sequential progress of the work.
 - 1.2.1.2.** Maintain complete and current submittal log, indicating status of all submittals and re-submittals. Provide summary of submittal status at pay request meeting.
- 1.2.2.** Failure to make timely submittals will not be reason for extension of Contract Time.
- 1.2.3.** Architect's review of submittals shall not relieve the Contractor for compliance with the Contract Documents, or for responsibility for deviations from Contract Documents.
 - 1.2.3.1.** In review of submittals, Architect will not provide dimensions or elevations for field conditions, or for conditions available from a detailed review of documents.
- 1.2.4.** Electronic Documents for Contractors Use.
 - 1.2.4.1.** At Architect's sole discretion, Architect will provide a file containing selected electronic file backgrounds for Contractor's use in shop drawing preparation.
 - 1.2.4.2.** Contractor shall sign Architect provided release form regarding such electronic file information.

- 1.2.4.3.** Electronic files will be provided in AutoCAD format, in the Architects current version, as background views only, without dimensions, doors, notes and similar information. No seals, title blocks or approval stamps will be included on backgrounds.
 - 1.2.4.4.** Unless otherwise established, and at Architects sole discretion, only plan and section views of architectural, structural, mechanical, and electrical documents will be provided. Under no circumstances will the complete project AutoCAD file be provided.
 - 1.2.4.5.** The Architect will provide a single CD based file containing backgrounds for all discipline for the contractors use. Contractor shall be responsible for distribution of background files to subcontractors and vendors.
 - 1.2.4.6.** The Architect will prepare a cost for preparation of electronic file package. If the Contractor agrees to such cost, the cost will be processed as a deductive change order to the contract.
- 1.2.5.** Copying of Contract Documents for use as submittals is not acceptable. Contractor shall produce original documents for shop drawings and other submittals.
- 1.2.6.** Provide submittals *within the following time periods and* as required for the orderly progress of the work. Where no time period is established, provide submittals no later than the midpoint between notice of award and scheduled start date of the work related to the submittal. *Where submittals are not submitted within specified limits, the Architect may delay certification of Payment Request until submittals are received.*
 - 1.2.6.1.** Asphalt Paving, including Mix Designs: No later than 14 days after Notice to Proceed.
 - 1.2.6.2.** Concrete, including Mix Designs: No later than 14 days after Notice to Proceed.
 - 1.2.6.3.** Mortar and Grout, including Mix Designs: No later than 14 days after Notice to Proceed.
 - 1.2.6.4.** Structural Steel: No later than 14 days after Notice to Proceed and as specified in Division 05.
 - 1.2.6.5.** Architectural Casework: No later than 60 days after Notice to Proceed.
 - 1.2.6.6.** Firestopping: No later than 60 days after Notice to Proceed.
 - 1.2.6.7.** Roofing and Sheet Metal: No later than 60 days after Notice to Proceed.
 - 1.2.6.8.** Doors, Door and Window Frames: No later than 60 days after Notice to Proceed.
 - 1.2.6.9.** Door Hardware: No later than 60 days after Notice to Proceed. In addition, provide Owner required keying information no later than 30 days before scheduled occupancy date.
 - 1.2.6.10.** All HVAC fire protection, plumbing and electrical fixtures, products and equipment: No later than 60 days after Notice to Proceed.
- 1.2.7.** The Architect's action will be taken within a reasonable time period, while allowing sufficient time, in the Architect's professional judgment, to permit adequate review.

- 1.2.8.** Transmit each submittal separately with Architect accepted form.
- 1.2.8.1.** Combine required material for a single specification Section into a single submittal. Incomplete or partial submittals will be returned without action for re-submittal in proper form.
 - 1.2.8.2.** Do not combine data from more than one specification section or drawing component into a single submittal. Such submittals received will be returned without action for re-submittal in proper form.
 - 1.2.8.3.** Submittals not reviewed by General Contractor will be returned without action for proper review and re-submittal.
 - 1.2.8.4.** Unless otherwise specified, submit product data in quantity required by Contractor for construction, plus three copies for Architect's use. Architect will review a maximum of six (6) copies of submittal.
- 1.2.9.** Sequentially number the transmittal forms. Re-submittals to have original number with an alphabetic or numeric suffix.
- 1.2.10.** Identify Project, Contractor, Subcontractor or supplier; pertinent Drawing sheet and detail number(s), and specification Section number, as appropriate.
- 1.2.11.** Apply Contractor's stamp, signed or initialed certifying that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and Contract Documents.
- 1.2.12.** Schedule submittals to expedite the Project, and deliver to Architect at business address. Coordinate submission of related items.
- 1.2.13.** Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.
- 1.2.13.1.** Clearly identify, with bold clouding, or other graphic notation, all deviations from Contract Documents. Provide boxed note at clouded deviation specifically requesting approval of proposed change. Provide documentation of proposed change, including additional graphics and data as required by Architect.
- 1.2.14.** Provide space for Contractor and Architect review stamps.
- 1.2.15.** Revise and resubmit submittals as required, identify all changes made since previous submittal.
- 1.2.15.1.** Provide re-submittals within seven days of receipt of returned submittal.
- 1.2.16.** Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.
- 1.2.16.1.** Distribute all copies of reviewed submittals at no additional cost to Owner for duplication, blueprinting, mailing or other costs.
- 1.2.17.** Do not send submittals unless required by Specification. Submittals transmitted to Architect not required by specification will be returned without review.

- 1.2.18.** Architect will notify Contractor of availability of documents for pickup at Architect's office, and log such date as the date returned to Contractor. Architect is not obligated to transmit or deliver submittals to Contractor.

1.3. DEFERRED APPROVALS

- 1.3.1.** Where shown on drawings and as specified in individual sections, submit documentation as required to obtain approval of all deferred approval work.

- 1.3.2.** Submit deferred approval documentation under the provisions of Section 01 33 00 and as specified in the respective Sections.

- 1.3.2.1.** Submit documentation prepared under the direct supervision of an Arizona licensed Engineer in the applicable discipline. All structural deferred approvals shall be prepared by Arizona licensed Structural Engineer.

- 1.3.2.1.1.** Provide Deferred Approval Number on the cover of each submittal.

- 1.3.2.1.2.** Provide document form with sufficient space for Architect review stamps.

- 1.3.2.2.** All deferred approvals shall be stamped and sealed by the responsible engineer, licensed as specified. Architect will review and mark with notation indicating that the deferred submittal documents have been reviewed and that they have been found to be in general conformance with the design of the project.

- 1.3.2.3.** Clearly identify all deviations and proposed alternates to materials and systems shown on drawings and specified in this Project Manual.

- 1.3.2.4.** Drawings: Produce drawings on substantial bond paper using media of archive quality. Indicate dimensional locations of the various parts of the construction, sizes and type of members, connections, attachments, and openings.

- 1.3.2.5.** Specifications: Provide specifications in an approved format illustrating materials and systems proposed for use in design.

- 1.3.2.6.** Structural Calculations: Produce calculations in booklet form, 8-1/2 x 11 inch size, minimum of 3 wet signed and sealed copies.

- 1.3.2.7.** Provide sufficient information with respect to design criteria, analysis methodology and material capacity to adequately evaluate documentation.

- 1.3.3.** Submittal Procedure:

- 1.3.3.1.** Submit completed documentation in accordance with scheduling criteria where defined in contract documents.

- 1.3.3.2.** The documents will be reviewed by Architect for consistency with specified criteria. If necessary, Architect will return submittal to Contractor for corrections. Any corrections, if any, shall be made by Contractor and returned to Architect within 7 days.

- 1.3.3.3.** No contract time extensions will be granted for document modification caused by non-conformance with specified criteria.

- 1.3.3.4. Architect will submit documents to reviewing authority for review and comment. Architect will return documents to Contractor following review
- 1.3.3.5. Where required, Contractor shall make all changes or corrections required by reviewing authority. Contractor shall pay all fees and provide all coordination and management necessary to obtain approval, including all meetings, correspondence and communications. Once corrections are made, Contractor shall return to Architect for resubmittal.
- 1.3.3.6. After receiving final approval, Architect will furnish Contractor one complete set of approved documents for Architects use in construction.
- 1.3.4. Samples: Provide samples as specified in each Section.
- 1.3.5. Manufacturer's Data: Provide descriptive data on all accessory items and operation.
- 1.3.6. Installation Data: Submit descriptive data on installation procedures.
- 1.4. PROPOSED PRODUCTS LIST AND PRODUCT DATA
 - 1.4.1. Where specified in individual sections, submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number for each product and supporting product data.
 - 1.4.1.1. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.
 - 1.4.2. Unless otherwise specified, submit product data in quantity required by Contractor for construction, plus three copies for Architect's use. Architect will review a maximum of six (6) copies of submittal.
 - 1.4.3. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this Project. Mark out items that are not applicable to the project.
 - 1.4.4. After review, distribute in accordance with this Section and provide copies for Project Record Documents described in Section 01 77 19 – Closeout Requirements.
- 1.5. SHOP DRAWINGS
 - 1.5.1. Submit in the form defined in the General Conditions and as specified.
 - 1.5.1.1. Submit shop drawings in black or colored image on white bond paper format – blue print copies are not acceptable.
 - 1.5.1.2. Submit a minimum of four (4) and maximum of six (6) copies. Architect will retain three copies for Architect's use.
 - 1.5.1.3. Architect will return one copy of marked up and stamped shop drawing to Contractor.
 - 1.5.1.3.1. Structural Steel, steel fabrications and metal decking.
 - 1.5.1.3.2. Reinforcing Steel
 - 1.5.1.3.3. Flashing and Sheet metal.

1.5.1.3.4. Skylights.

1.5.2. Provide the following information on each sheet:

1.5.2.1. Project name and location.

1.5.2.2. Contractor name and address.

1.5.2.3. Subcontractor, manufacturer, or fabricator name and address.

1.5.2.4. Date and scale of drawings

1.5.2.5. Space for Contractor's review and approval stamp.

1.5.3. After review, reproduce and distribute in accordance with this Section and as described for Project Record Drawings in Section 01 77 19 – Closeout Requirements.

1.6. MANUFACTURER'S INSTRUCTIONS AND CERTIFICATES

1.6.1. When specified in individual specification Sections, submit manufacturers certificates and instructions for delivery, storage, assembly, installation, start - up, adjusting, and finishing, in quantities specified for Product Data.

1.6.2. Identify conflicts between manufacturers' instructions and Contract Documents.

1.6.3. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

1.6.4. Certificates may be recent or previous test results on material or Product, but must address current regulatory requirements and be acceptable to Architect.

1.7. SAMPLES

1.7.1. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

1.7.2. Include identification on each sample, with full Project information.

1.7.3. Submit the number of samples of selected finish color, texture, and pattern as specified in individual specification Sections, with a minimum of five samples provided. Where multiple samples are specified, the Architect will retain four sets.

1.7.4. Submittal Procedure for Color Section:

1.7.4.1. Initial Submittal: Using manufacturers standard sample delivery system, submit two sets of samples of colors and finishes from the full range of manufacturers' standard colors (and custom colors if specified), textures, and patterns for Architect initial selection.

1.7.4.2. The Architect will notify Contractor of initial selection by ASI.

1.7.4.3. Following receipt of initial selection, submit the number of samples of selected finish color, texture, and pattern as specified in individual specification Sections, with a minimum of five samples provided. Where multiple samples are specified, the Architect will retain three sets.

1.8. CONSTRUCTION PROGRESS SCHEDULES

- 1.8.1.** Submit Construction Schedule in accordance with the General Conditions and as specified.
 - 1.8.1.1.** Submit initial schedule within 10 days of date of Notice to Proceed.
 - 1.8.1.2.** Submit updated schedule with each pay request, reflecting all adjustments in construction schedule and sequence.
 - 1.8.1.3.** Pay Requests will not be processed without submission of updated schedule.
- 1.8.2.** Provide overall Construction Schedule in horizontal bar chart form or other Architect approved format, for each building and site work, with separate line for each major work activity, and scheduled on a weekly basis. Integrate all portions of project to identify critical path. Prepare schedule based on Phases as shown on drawings and specified.
- 1.8.3.** Group related and coordinated activities. Identify early/late start and finish dates, major milestones, float dates, and duration of each activity.
- 1.8.4.** Identify all utility and service interruptions and connections, including disconnection of existing buildings.

1.9. SUBSTITUTIONS

- 1.9.1.** Substitutions will be considered in accordance with the General Conditions and Section 01 25 00.
- 1.9.2.** Substitutions will not be considered when indicated or implied on shop drawings or other forms of submittal without separate written request for substitution.

2. PART 2 - PRODUCTS

Not Used

3. PART 3 - EXECUTION

Not used

END OF SECTION

SECTION 01 42 29
REFERENCE STANDARDS

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** References
- 1.1.2.** Definitions.

1.2. DEFINITIONS

- 1.2.1.** General: Basic Contract definitions are included in the Conditions of the Contract.
- 1.2.2.** "Approved": The term "approved," when used in conjunction with Architect's action on Contractor's submittals, applications, and requests, is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- 1.2.3.** "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by Architect, requested by Architect, and similar phrases.
- 1.2.4.** "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on Drawings; or to other paragraphs or schedules in Specifications and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference.
- 1.2.5.** "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.
- 1.2.6.** "Furnish": The term "furnish" means to supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- 1.2.7.** "Install": The term "install" describes operations at Project site including unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- 1.2.8.** "Provide": The term "provide" means to furnish and install, complete and ready for the intended use.
- 1.2.9.** "Installer": An installer is Contractor or another entity engaged by Contractor, as an employee, subcontractor, or contractor of lower tier, to perform a particular construction operation, including installation, erection, application, and similar operations.
- 1.2.10.** The term "experienced," when used with the term "installer," means having successfully completed a minimum of five [5] previous projects similar in size and scope to this Project; being familiar with the special requirements indicated; and having complied with requirements of authorities having jurisdiction.

- 1.2.10.1.** Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.

1.3. INDUSTRY STANDARDS

- 1.3.1.** Applicability of Standards: Unless the Contract Documents or applicable regulatory requirements include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- 1.3.1.1.** The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.
- 1.3.1.2.** Referenced standards take precedence over standards that are not referenced but recognized in the construction industry as applicable.
- 1.3.1.3.** Non-referenced standards are not directly applicable to the Work, except as a general requirement of whether the Work complies with recognized construction industry standards.
- 1.3.1.4.** Non-referenced standards: Except as otherwise limited by the Contract Documents, standards not referenced but recognized in the industry as applicable will be evaluated for performance of the Work. The Architect will decide whether a code or standard is applicable, or which of several are applicable.
- 1.3.2.** Publication Dates: Conform to reference standard by date of issue current on date of project approval by the authority having jurisdiction, or date specified in Product Sections.
- 1.3.3.** Conflicting Requirements: Where compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- 1.3.3.1.** Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to Architect for a decision before proceeding.
- 1.3.4.** Copies of Standards: Each entity engaged in construction on Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
- 1.3.4.1.** Obtain copies directly from the publication source when required by Contract Documents.

1.3.4.2. Although copies of standards needed for enforcement of requirements may be part of required submittals, the Architect reserves the right to require the Contractor to submit additional copies as necessary for use by others in the enforcement of requirements.

1.3.5. Abbreviations and Acronyms for Industry Organizations: Where abbreviations and acronyms are used in Contract Documents, they shall mean the recognized name of the entities indicated in Gale Research's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the United States". Contact Architect regarding any questions regarding such abbreviations and acronyms.

1.4. PROJECT MANUAL AND SPECIFICATIONS

1.4.1. Format and structure

1.4.1.1. Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 49-Division format and 2004 Masterformat numbering system.

1.4.1.2. The sections are placed in the Project Manual in numeric sequence; however, this sequence is not complete and the Table of Contents of the specifications must be consulted to determine the total listing of sections.

1.4.1.3. The section title is not intended to limit the meaning or content of the section, nor to be fully descriptive of the requirements specified within the Section.

1.4.1.4. The organization of the specifications shall not control the division of the work among subcontractors or establish the extent of work to be performed by any trade.

1.4.2. Definitions

1.4.2.1. Related Work Described Elsewhere: The caption "Related Sections" or "Related Work Described Elsewhere" identifies some Sections of the Specifications which may involve work involving coordination or general relationships to the work of the Section at hand. The omission of a Section from "Related Sections" or "Related Work Described Elsewhere" does not limit the Contractor's obligation to perform all portions of the Work with all appropriate and reasonable coordination.

1.4.2.2. Section Includes: The caption "Section Includes" or "Description" or "Summary" paragraph is intended to be a broad, general statement of the work covered by an individual section. The listing of principal items of work shall not be construed as an exhaustive or complete list.

1.4.3. Language

1.4.3.1. Specification Language and Intent: The words "the", "shall", "will", and all may be omitted in specification Sections. Where such words as "perform", "install", "erect", "test", or words of similar import are used, it shall be understood such words include the meaning of the phrase, "The Contractor Shall". The requirements indicated and specified apply to all work of the same kind, class, and type, even though the word "all" is not stated.

1.4.3.2. Specifications use certain conventions regarding style of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are:

1.4.3.2.1. Language used in Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words that are implied, but not stated, shall be interpolated as the sense requires. Singular words shall be interpreted as plural and plural words interpreted as singular where applicable to maintain the context of the Contract Document indicated.

1.4.3.2.2. Imperative and streamlined language is generally used in the Specifications. Requirements expressed in the imperative mode are to be performed by the Contractor. Subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor, or by others when so noted.

1.4.3.2.3. The words “shall be” are implied wherever a colon (:) is used within a sentence or phrase.

2. PART 2 - PRODUCTS

Not Used

3. PART 3 – EXECUTION

Not Used

END OF SECTION

SECTION 01 45 00
QUALITY CONTROL

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Quality assurance and control of installation.
- 1.1.2.** Contractor responsibility for structural tests and special inspections.

1.2. QUALITY ASSURANCE/CONTROL OF INSTALLATION

- 1.2.1.** Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.
- 1.2.2.** Comply fully with manufacturers' instructions, including each step in sequence. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- 1.2.3.** Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- 1.2.4.** The Owner will retain a general inspector to inspect all work performed.
 - 1.2.4.1.** The Owner will retain special inspectors for those portions of the work as shown on the drawings and specified in the respective sections.
- 1.2.5.** Perform work by persons qualified to produce workmanship of specified quality.
- 1.2.6.** Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.3. CONTRACTOR RESPONSIBILITY

- 1.3.1.** Each Contractor responsible for the construction of a main wind- or seismic-force-resisting system, designated seismic system or a wind- or seismic-resisting-component listed in the statement of special inspections shall submit a statement of responsibility to the building official and the Owner prior to commencement of work on the system or component. The Contractor's statement of responsibility shall contain the following:
 - 1.3.1.1.** Acknowledgment of awareness of the special requirements contained in the statement of special inspections;
 - 1.3.1.2.** Acknowledgment that control will be exercised to obtain conformance with the construction documents approved by the building official;
 - 1.3.1.3.** Procedures for exercising control within the Contractor's organization, the method and frequency of reporting and the distribution of the reports;
 - 1.3.1.4.** Identification and qualifications of the person(s) exercising such control and their position(s) in the organization.

1.4. FIELD SAMPLES

- 1.4.1.** Install field samples or mock-ups for review at the site as required by individual specifications Sections.
- 1.4.2.** Acceptable samples represent a quality level for the Work.
- 1.4.3.** Remove field sample or mock-up when specified in individual Sections.

1.5. MANUFACTURERS' FIELD SERVICES AND REPORTS

- 1.5.1.** When specified in individual specification Sections, require material or Product suppliers or manufacturers provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start - up of equipment, test, adjust, and balance of equipment as applicable, and to initiate instructions when necessary.
- 1.5.2.** Report to the Architect observations, site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- 1.5.3.** Submit report in duplicate within 5 days of observation.

2. PART 2 - PRODUCTS

Not Used

3. PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01 45 29
TESTING LABORATORY SERVICES

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Selection and payment.
- 1.1.2.** Contractor submittals.
- 1.1.3.** Laboratory responsibilities.
- 1.1.4.** Laboratory reports.
- 1.1.5.** Limits on testing laboratory authority.
- 1.1.6.** Contractor responsibilities.
- 1.1.7.** Schedule of inspections and tests.

1.2. SELECTION AND PAYMENT

- 1.2.1.** Owner will employ and pay for services of an independent testing laboratory to perform inspection and testing as specified in this Section.
 - 1.2.1.1.** Unless specified as the Owners responsibility, all other testing, mix design preparation and related quality control and certification requirements shall be paid by the Contractor at no additional cost to Owner.
- 1.2.2.** The Contractor shall reimburse the Owner, through Contract adjustment, for inspection and testing costs caused by the following Contractor actions:
 - 1.2.2.1.** All testing costs incurred after initial test established non-conformance with contract requirements.
 - 1.2.2.2.** Inspection costs caused by Contractors scheduling of work requiring inspections of less than 4 hours duration.
 - 1.2.2.3.** Inspection costs caused by Contractors failure to complete work requiring inspection within the scheduled duration period shown on Contractors initial construction schedule.

1.3. QUALITY ASSURANCE

- 1.3.1.** Laboratory: Authorized to operate in Arizona.
- 1.3.2.** Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
- 1.3.3.** Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either National Bureau of Standards (NBS) Standards or accepted values of natural physical constants.

1.4. LABORATORY RESPONSIBILITIES

- 1.4.1.** Perform specified inspection, sampling, and testing of Products in accordance with specified standards.
- 1.4.2.** Ascertain compliance of materials and mixes with requirements of Contract Documents. Promptly notify Architect of observed irregularities or non-conformance of Work or Products.
- 1.4.3.** Perform additional inspections and tests required by Architect.

1.5. LABORATORY REPORTS

- 1.5.1.** After each inspection and test, promptly submit copies of laboratory report to Architect, Structural Engineer, Contractor, Owner, Project Inspector, and other parties as required by referenced sections and applicable regulations.
- 1.5.2.** Include:
 - 1.5.2.1.** Date issued.
 - 1.5.2.2.** Project title and number.
 - 1.5.2.3.** Name of inspector.
 - 1.5.2.4.** Date and time of sampling or inspection.
 - 1.5.2.5.** Method of obtaining sample.
 - 1.5.2.6.** Identification of product and Specifications section.
 - 1.5.2.7.** Location in the Project.
 - 1.5.2.8.** Type of inspection or test.
 - 1.5.2.9.** Date of test.
 - 1.5.2.10.** Results of tests.
 - 1.5.2.11.** Conformance with Contract Documents. When requested by Architect, provide interpretation of test results.
 - 1.5.2.12.** Indicate samples taken but not tested.

1.6. LIMITS ON TESTING LABORATORY AUTHORITY

- 1.6.1.** Laboratory may not release, revoke, alter, or enlarge requirements of Contract Documents.
- 1.6.2.** Laboratory may not approve or accept any portion of the Work.
- 1.6.3.** Laboratory may not assume any duties of Contractor.
- 1.6.4.** Laboratory has no authority to stop the Work.

1.7. CONTRACTOR RESPONSIBILITIES

- 1.7.1.** Deliver or make available to laboratory at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
- 1.7.2.** Cooperate with laboratory personnel, and provide access to the Work and to manufacturer's facilities.
- 1.7.3.** Provide incidental labor and facilities to provide access to Work to be tested, to obtain and handle samples at the site or at source of Products to be tested, to facilitate tests and inspections, storage and curing of test samples.
- 1.7.4.** Notify Architect and laboratory 48 hours prior to expected time for operations requiring inspection and testing services.

1.8. SCHEDULE OF INSPECTIONS AND TESTS BY OWNERS TESTING AGENCY

1.8.1. Site Excavation, Fills and Foundation Preparation (IBC Chapter 33)

- 1.8.1.1.** All earthwork, including earth fill compaction - 3301

1.8.2. Concrete (IBC Chapter 19)

1.8.2.1. Materials

- 1.8.2.1.1.** Portland Cement Tests - 1903.2

- 1.8.2.1.2.** Concrete Aggregates - 1903.3

- 1.8.2.1.3.** Reinforcing Bars - 1903.5

1.8.2.2. Concrete Quality

- 1.8.2.2.1.** Proportions of Concrete - 1905.2

- 1.8.2.2.2.** Strength Tests for Concrete - 1903.8.4

1.8.2.3. Concrete Inspection

- 1.8.2.3.1.** Job Site Inspection - 1905.10

1.8.3. Masonry (IBC Chapter 21)

1.8.3.1. Materials

- 1.8.3.1.1.** Mortar and grout - 2103.3; 2103.4

1.8.3.2. Masonry Quality

- 1.8.3.2.1.** Mortar and Grout Tests - 2105.4; 2105.5

1.8.4. Structural Steel (IBC Chapter 22)

1.8.4.1. Materials

- 1.8.4.1.1.** Structural Steel, Cold Formed Steel - 2202.1; 2231.1

1.8.4.1.2. Material Identification - 2203

1.8.4.2. Inspection of Structural Steel

1.8.4.2.1. Tests of Structural and Cold Formed Steel – 2231.1

1.8.4.2.2. Tests of High Strength Bolts, Nuts, Washers– 2231.2

1.8.4.2.3. Tests of End Welded Studs - 2231.3

1.8.4.2.4. Steel Joist Design Verification Load Tests - 2212.7

1.8.4.2.5. Shop Fabrication Inspection - 2231.4

1.8.4.2.6. High Strength Bolt Inspection - 2231.6

1.8.4.2.7. Welding Inspection - 2231.5

1.8.4.2.8. Nelson Stud Welding - 2231.5

1.8.4.3. Non-Destructive Weld Testing –1703

1.8.5. Miscellaneous Fasteners

1.8.5.1. Anchorage test methods as shown on drawings and specified in respective sections.

2. PART 2 - PRODUCT

Not Used

3. PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Temporary Utilities: Electricity, lighting, telephone service, and sanitary facilities.
- 1.1.2.** Temporary Controls: Barriers, enclosures and fencing, protection of the Work, and related operational requirements.
- 1.1.3.** Construction Facilities: Access, parking, and progress cleaning.

1.2. TEMPORARY ELECTRICITY

- 1.2.1.** Connect to existing power service. Power consumption shall not disrupt Owner's need for continuous service. Coordinate location of connection with owner.
- 1.2.2.** Owner will pay cost of energy used. Exercise measures to conserve energy.
- 1.2.3.** Provide all required disconnects, overcurrent protection devices, branch circuits, power cords, and outlets as required for the Work.
- 1.2.4.** Where approved by Architect, permanent convenience outlets may be used during construction.

1.3. TEMPORARY LIGHTING

- 1.3.1.** Utilize existing fixtures where feasible or connect temporary lighting to existing power service. Power consumption shall not disrupt Owner's need for continuous service. Coordinate location of connection with owner.
- 1.3.2.** Owner will pay cost of energy used. Exercise measures to conserve energy.
- 1.3.3.** Provide all required disconnects, overcurrent protection devices, branch circuits, power cords, and outlets as required for the Work.
- 1.3.4.** Where approved by Architect, permanent convenience outlets may be used during construction.
- 1.3.5.** Provide adequate lighting for security of construction operations and storage areas. .
- 1.3.6.** Provide all lighting required for safety and security of paths and areas affected by construction, including pedestrian walkways.
- 1.3.7.** Maintain lighting and provide routine repairs.
- 1.3.8.** Provide and maintain, at all times, temporary lighting and exit light/path devices in corridor areas as required by applicable codes.
- 1.3.9.** Existing permanent lighting fixtures may be utilized during construction, supplemented by temporary lighting as required.

1.4. TEMPORARY HEAT AND VENTILATION

- 1.4.1.** Provide temporary heating, ventilating and air conditioning (HVAC) systems as necessary for the drying out of the building, the proper installation of Work and materials, and the protection of Work and materials against injury from condensation, dampness and cold. Where necessary to comply with requirements of this Section, provide ducted ventilation system.
- 1.4.2.** Ventilate enclosed areas to prevent accumulation of dust, fumes, vapors, or gases. Where necessary to comply with requirements of this Section, provide ducted ventilation system.
 - 1.4.2.1.** Utilize equipment as required to exhaust noxious fumes directly to the outside of the building at an approved location.
 - 1.4.2.2.** Locate ventilation discharge point at an approved location, away from walkways, HVAC intakes, windows of occupied areas, and other similar locations.
 - 1.4.2.3.** No internal combustion engines will be allowed within the building or within 50 feet of the building without prior written authorization from the Owner.
- 1.4.3.** Use of permanent equipment for temporary HVAC is prohibited without prior approval by Architect. Where prior approval is given, Contractor shall be responsible for cost of all energy used, filter replacement, and other operational criteria.
- 1.4.4.** Maintain temperatures as required by occupational safety regulations.
- 1.4.5.** Owner will pay cost of energy used. Exercise measures to conserve energy.

1.5. TELEPHONE/FAX/COPY/DATA SERVICE

- 1.5.1.** Provide, maintain and pay for cellular telephone service, available for Owners and Inspectors unlimited use while on site.
- 1.5.2.** Telephone service shall be in place at time of project mobilization.
 - 1.5.2.1.** Provide portable phone, pager, or similar device for use by Superintendent when away from field office.
 - 1.5.2.2.** Provide, maintain and pay for xerographic copy machine, with 11 x 17 copy capability, able to scan up to 300 dpi to PDF format, with email export capability, located in Contractors field office.
- 1.5.3.** Provide, maintain and pay for internet data service to Contractor's field office and to Owners/Inspectors office.
 - 1.5.3.1.** Provide separate internet service line for inspector's office. Service shall be high-speed cable. DSL is acceptable if no cable service is available.
 - 1.5.3.2.** Coordinate with Owner and Project Inspector on all required connection protocols, including security. Modify service as required to comply with Owner requests. Provide data jack type and location as required by Owner.
 - 1.5.3.3.** Data service shall be in place prior to start of construction.

1.6. TEMPORARY WATER SERVICE

- 1.6.1.** Provide and maintain connection to existing water service.
- 1.6.2.** Owner will pay cost of water used. Exercise measures to conserve water.

1.7. TEMPORARY SANITARY FACILITIES

- 1.7.1.** Provide, maintain, and pay for all temporary toilet facilities as required to implement the work in compliance with all regulations, and as specified.
 - 1.7.1.1.** Provide two toilet facilities at site, one each for male and female employees, or as required for all Contractor and subcontractor forces on each site, whichever is greater.
 - 1.7.1.2.** Maintain in a clean and sanitary condition at all times, with all required supplies.
- 1.7.2.** Use of existing toilet facilities, or toilets constructed as a part of this Contract, is prohibited.

1.8. BARRIERS AND BARRICADES

1.8.1. Exterior

- 1.8.1.1.** Provide barriers to prevent unauthorized entry to construction areas, to allow for Owner's use of site, and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
 - 1.8.1.1.1.** When regulated by codes, such legal requirements for protection shall be considered as minimum requirements. Provide protective measures in excess of such minimum requirements as specified or required.
- 1.8.1.2.** Provide barricades around excavations.
- 1.8.1.3.** Provide protection for all plant life designated to remain.
 - 1.8.1.3.1.** Replace damaged plant life with approved equivalent.
 - 1.8.1.3.2.** Erect tree protection within 3 days of mobilization. Enclose trees designated to remain with 2 x 4 wood frame. Install frame minimum 6 feet from trunk diameter, all sides. Provide 4x4 post supports, minimum 3 feet high, embedded 3 feet, at 3 foot on center maximum. Wrap frame with snow type fencing, in bright iridescent color visible at night.
- 1.8.1.4.** Protect non-owned vehicular traffic, stored materials, site and structures from damage.

1.8.2. Interior

- 1.8.2.1.** After beneficial occupancy, and where required to permit Owners on-going operations, provide barriers as specified.

1.8.2.1.1. Construct barriers as metal framed/fire-resistive gypsum board fire resistive corridor construction, with self-closing, latching door assembly. Provide temporary partition and door assembly fire resistivity rating equal to the assembly being replaced. Close joints and seal edges at intersections with existing surfaces.

1.8.2.1.2. Use of sheet plastic dust barriers in place of rated assemblies is prohibited.

1.8.2.2. Protect existing surfaces, equipment and furnishings from damage from construction operations and demolition. Where necessary, remove and store in separate area.

1.8.2.3. Where demolition or construction operations generate fine dust or air-borne particulates, provide fire retardant drop cloths, screening or other approved barriers to prevent dust intrusion into existing cabinet interiors, equipment, drawers, and similar conditions.

1.8.3. Paint surfaces exposed to view from Owner-occupied areas with approved water based paint and in color as selected by Owner.

1.9. FENCING

1.9.1. Erect chain link fence around around perimeter of work areas as shown on drawings within 3 days of mobilization. Submit detailed plan of fence, including gates, for review and approval by Architect and Owner. Show flow of construction traffic.

1.9.1.1. Provide 6 foot high fence, with top rail and bottom wire. Provide fabric with selvedge edge and line posts at maximum 9 feet on center.

1.9.1.2. Obtain Architect approval of embedment method at paving areas. Provide portable T-frame fencing panels with concrete base supports.

1.9.1.3. Provide chain link fencing fabric and supports free of sags, breaks, rust and distortion.

1.9.1.4. Following Owners beneficial occupancy of portions of project, erect chain link fence at locations as approved by Architect to provide for complete segregation of construction and Owner operations.

1.9.2. Provide gates affording access as required by fire department having jurisdictional authority.

1.9.3. Obtain and pay for required permits and inspections.

1.9.4. Remove construction fence and other related construction upon completion of Work, or sooner if so authorized or required to maintain Project progress.

1.10. WATER CONTROL

1.10.1. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

1.10.2. Protect site from puddling or running water. Provide water barriers as required to protect site and adjacent property from soil erosion and siltation.

- 1.10.3.** Obtain all necessary permits, including preparation of engineering documentation, as required to comply with jurisdictional authority regulations regarding storm run-off and erosion control. Compliance with requirements of the federal Clean Water Act, associated State Water Resources Board and local regulations is specifically required.
 - 1.10.3.1.** Prepare and file on Owners behalf, the Notice of Intent. Owner will reimburse filing fee.
 - 1.10.3.2.** Prepare and maintain on-site "Storm Water Pollution Prevention Plan" (SWPPP), as required.
 - 1.10.3.2.1.** Plan shall include methods for controlling non-storm water discharge sources, such as pipe flushing, de-watering, street sweeping, clean-up, and other similar construction operations.
 - 1.10.3.2.2.** Plan shall incorporate use of Best Available Technology and Best Management Practices to prevent and/or control storm water and non-storm water discharge and run-off as required by current regulations adopted by Regional Water Quality Control Board having jurisdiction..
 - 1.10.3.2.3.** Plan shall incorporate use of testing and monitoring procedures and reporting methods as required by current regulations adopted by Regional Water Quality Control Board having jurisdiction.
 - 1.10.3.3.** Designate staff member responsible for SWPPP compliance, including monitoring, testing, and reporting procedures.
 - 1.10.3.3.1.** Inspect all SWPPP aspects before and after a storm event to maximize effective control.
 - 1.10.3.3.2.** Verify compliance with all SWPPP controls of non-storm water discharges.
 - 1.10.3.3.3.** Provide Owner with a written report of each inspection, certifying compliance or defining modifications made to achieve compliance with regulations.
 - 1.10.3.3.4.** Within 48 hours of occurrence, file written report of all SWPPP violations with Owner.
 - 1.10.3.3.5.** Submit annual certification of compliance with the SWPPP with the Owner until project completion.

1.11. PROTECTION OF INSTALLED WORK

- 1.11.1.** Protect installed Work and provide special protection where specified in individual specification Sections.
- 1.11.2.** Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.
- 1.11.3.** Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

- 1.11.4.** Provide and maintain all required dams, screens and collection systems necessary to prevent water used in interior demolition or construction operations from damaging adjacent areas.
- 1.11.5.** Take all means required to prevent damage to project, including interior areas, resulting from inclement weather, water, wind or other environmental impacts. Provide temporary coverings or enclosures as required for all roof and wall penetrations. Where moisture from condensation, rain or high winds is forecast or present, Contractor shall take all means to eliminate or prevent danger to the Work and to adjacent property, including covering unprotected surfaces, making all openings weather tight, removing loose materials, tools or equipment from exposed locations and removing or securing scaffolding.
- 1.11.6.** Provide, operate, and maintain pumping equipment required to remove water from the site, roof and interior flooded areas.

1.12. PARKING AND TRAFFIC CONTROL

1.12.1. Parking Criteria

- 1.12.1.1.** Coordinate location and number of parking spaces to be made available for Contractors forces with Owner.
- 1.12.1.2.** Do not permit parking on adjacent public streets.
- 1.12.1.3.** Parking for workmen employed on the work may be provided on the site, when approved by the Owner, and to the extent that space for that purpose is available without interference with activities related to performance of the Work. Additional parking spaces required by the Contractor shall be secured at Contractors own expense.

1.12.2. Traffic Control

- 1.12.2.1.** Traffic maintenance: Prior to start of work, determine the routing of construction vehicles, and the safeguards and procedures necessary to carry out the work. Obtain the Owner's approval of the traffic routes, and for any removal, temporary relocation and reinstallation of traffic control signal. In addition:
 - 1.12.2.1.1.** Be responsible for controlling construction traffic within and adjacent to the site.
 - 1.12.2.1.2.** Provide entrances, lifts and safeguards required or necessary to the progress of the work, and effectively control such traffic to provide minimum hazard to the work and all persons.
 - 1.12.2.1.3.** Route construction equipment, trucks, and similar vehicles via existing public streets to and from the site as approved by the governing authorities.
 - 1.12.2.1.4.** Where construction traffic occurs when Owner personnel, students and staff are on site campus, provide "spotter" responsible for leading construction traffic through site campus areas.

- 1.12.2.1.5.** Obtain and pay for permits and inspections made necessary by use of public street, sidewalks, curbs, and paving. Post guarantees and bonds that may be required, and repair and make good any damages thereto acceptable to the authorities having jurisdiction.
- 1.12.2.1.6.** Construct and maintain temporary walks for pedestrians. Keep streets adjacent to the site open to vehicular and pedestrian traffic.
- 1.12.2.1.7.** Maintain constant access for police, fire and ambulance service.
- 1.12.2.1.8.** Provide and maintain for proper control of traffic and safety of all concerned. Provide all necessary barricades, suitable and sufficient lights, reflectors, and danger signals.
- 1.12.2.1.9.** Provide warning and closure signs, directional and detour signs, and whatever additional measures are necessary.
- 1.12.2.1.10.** Indicate on a 24-hour basis restricted and dangerous conditions existing on or adjacent to the site. Illuminate barricades, danger signals, warning signs and obstructions at night. Keep warning lights burning from sunset until sunrise.

1.13. ACCESS ROADS

- 1.13.1.** Coordinate location of access roads with Owner.
 - 1.13.1.1.** *Contractor shall maintain temporary access roads as required to implement the work under this contract, including currently developed access road.*
- 1.13.2.** Provide and maintain access to fire lanes and fire hydrants at all times, free of obstructions. Coordinate location, locking device and dimension of gates with fire department having jurisdiction.
 - 1.13.2.1.** Provide trench plates as required to resist traffic loads, including fire department vehicles.
 - 1.13.2.2.** Where trench plates occur in pedestrian paths, install with transitions as required to comply with accessibility regulations.
 - 1.13.2.3.** Obtain Fire Marshal approval of all trench plate installations.
- 1.13.3.** Do not permit delivery trucks to block, park or wait on public streets.
- 1.13.4.** Coordinate site access through locked access gates with Owner. Keys to such gates will not be released to Contractor.

1.14. PROGRESS CLEANING

- 1.14.1.** Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

- 1.14.2.** Use cleaning materials which do not create hazards to health or property and which will not damage surfaces. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.
- 1.14.3.** Provide for all dumpsters, haul fees and dump charges as required. Do not use Owners collection facilities at any time.
- 1.14.4.** Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- 1.14.5.** Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- 1.14.6.** Remove waste materials, debris, and rubbish from interior spaces daily and deposit in approved dumpster location. Remove from site weekly. Dispose off-site in a legal manner.
- 1.14.7.** Broom and vacuum clean interior areas prior to start of all surface finishing, including painting, and continue cleaning on an as-needed basis until painting and surface finishes are complete.
- 1.14.8.** Schedule operations so that dust and other contaminants resulting from cleaning procedures or construction operations will not fall on wet or newly-coated surfaces.
- 1.14.9.** Maintain all public streets free of dust, mud, and debris as required by jurisdictional authority. Maintain parking lots, drives and walkways free of dust, mud and debris when Owner takes beneficial occupancy of a portion of project prior to final completion.
- 1.14.10.** Provide watering, dust palliative admixture or other methods as required to minimize dust generation during work. Where required by Owner, provide dust screen netting at property line temporary fencing.

1.15. FIELD OFFICES AND SHEDS

- 1.15.1.** Provide and maintain weatherproof and waterproof field office structures for Contractors use as necessary for the proper execution of the work. Use of Inspectors office for Contractors administration of the work is not permitted.
 - 1.15.1.1.** Provide phone/fax/copy machine service for Contractor's use as specified.
- 1.15.2.** Locate offices and sheds as directed by Architect .
- 1.15.3.** All field offices shall remain the property of the Contractor and shall be removed from the site upon completion of the work.
- 1.15.4.** Furnish, install and maintain tool cribs, sheds and storage units for the Contractors use as necessary for the proper execution of the work.
 - 1.15.4.1.** Provide all necessary barricades, warning devices and enclosures required to protect and direct visitors and staff around tool and equipment located in passageways and corridors.
 - 1.15.4.2.** Return all small tools and secure in locked compartments or cribs at close of work day.

- 1.15.4.3. Safe-off or lock all equipment and large tools. Disable from malicious or accidental start-up and operation.
 - 1.15.4.4. Storage facilities shall provide protection of all products from damage due to environmental conditions, abuse, or theft.
 - 1.15.5. Requirements of regulatory agencies: Comply with requirements of regulatory agencies having jurisdiction. Obtain and apply for permits required by governing authorities.
 - 1.15.6. Job Conditions: Locate temporary structures to avoid interference with Work. Relocate temporary structures as required by job progress.
- 1.16. RECORD DOCUMENTS: JOB SET
 - 1.16.1. Contractor shall maintain, on site, one copy of the following contract documents, defined as the Record Job Set. Stamp set "RECORD JOB SET - DO NOT REMOVE". During the course of construction, use this set to record actual revisions to the Work.
 - 1.16.1.1. Construction Drawings.
 - 1.16.1.2. Project Manual/Specifications.
 - 1.16.1.3. Addenda.
 - 1.16.1.4. Change Orders and other Modifications to the Contract.
 - 1.16.1.5. Reviewed shop drawings, product data, and samples.
 - 1.16.2. Store Record Job Set separate from documents used for construction.
 - 1.16.3. Transfer information concurrent with construction progress. Record Job Sets will be reviewed at each Progress Meeting.
 - 1.16.3.1. Where Record Job Sets do not reflect actual field conditions, the Architect may delay certification of Payment Request until sets are updated to the Architects satisfaction.
 - 1.16.3.2. Record Job Set information reflecting engineering elevations, locations and alignments shall be prepared by competent staff experienced in surveying methods a licensed Land Surveyor or Civil Engineer, licensed in Arizona.
 - 1.16.3.3. Cost of Record Job Set preparation shall be paid by Contractor at no additional cost to Owner.
 - 1.16.3.4. Cost of all civil engineering and surveying associated with Record Job Set preparation shall be paid by Contractor at no additional cost to Owner. Other than the payment for services related to work of this contract, the Civil Engineer or Surveyor shall have no financial or business relationship with Contractor.
 - 1.16.4. Specifications: Legibly mark and record at each Part 2 Product section description of actual Products installed, including the following:
 - 1.16.4.1. Manufacturer's name and product model and number.
 - 1.16.4.2. Product substitutions or alternates utilized.

1.16.4.3. Changes made by Addenda and Modifications.

1.16.5. Recording Data: Legibly mark each item to record actual construction including:

1.16.5.1. Measured actual horizontal and vertical locations of underground utilities, sub-drains, services and appurtenances, to a tolerance of 2 inches plus/minus, referenced to permanent surface improvements. Include elevations of all water lines, utilities, sanitary and storm drain inverts and storm drain/sub-drain/canyon drain system outfalls.

1.16.5.2. Field changes of dimension and detail, including alignments, gutter slopes, slope bank locations, drainage structures, and related site improvements.

1.16.5.3. Earthwork Engineering Record Documents, consisting of actual field elevations of grading and earthwork, to a tolerance of 0.1 feet. The actual elevation of each elevation shown on drawings shall be recorded. In addition, provide actual elevations at 50 foot intervals along all finish grade contours as shown on drawings, including all grade breaks and the top and toe of all slopes.

1.16.5.3.1. Where actual field elevations exceed specified tolerances, correct field condition and re-survey prior to preparation of final Record Set.

1.16.5.3.2. Record actual elevation in a rectangular box directly above the elevation or contour shown on drawings, using red, permanent ink.

1.16.5.4. Measured locations of internal utilities, services, and appurtenances concealed in construction, to a tolerance of 1 inch plus/minus, referenced to visible and accessible features of the Work.

1.16.5.5. Field changes of major architectural features, such as door relocation, wall furring, field changes of dimension and detail, and material transitions.

1.16.5.6. Details not on original Contract Drawings.

1.17. REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

1.17.1. Remove temporary utilities, equipment, facilities, and materials, prior to Final Application for Payment.

1.17.2. Clean and repair damage caused by installation or use of temporary work.

1.17.3. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

1.18. SECURITY

1.18.1. Provide security and facilities as necessary to protect work and personnel from vandalism, unauthorized entry, theft, damage, or assault.

1.18.2. Within a 48 hour period, replace or repair, to specified condition, all surfaces or items damaged by graffiti during course of construction.

1.18.3. Where Owner has given approval to take fire detection system off-line, return system to active status at completion of work or end of each work period.

- 1.18.3.1.** Where security or fire detection systems are disabled for any reason, including where Owner has given approval for such system shut-down, provide fire watch or security guard service as directed by Owner and at no additional cost to the Owner.
- 1.18.4.** After beneficial occupancy by Owner, all Contractor staff, subcontractors and suppliers shall notify Owners administrative staff when on site, and sign in and out with staff as directed by Owner. Notify staff when work is completed or shut-down for that work period.
- 1.18.4.1.** Wear badges with photo identification as directed by Owner at all times. In addition, wear orange safety vests or other approved shirt design at all times.
- 1.18.4.2.** Do not enter student or staff rooms at any time without approval of staff.
- 1.18.4.3.** All Contractor's staff, subcontractors and suppliers shall avoid interaction, contact and communication with students. Under no circumstances shall Contractors staff, subcontractors and suppliers be in contact with students without Owner staff present.
- 1.18.4.4.** All work, including work of subcontractors, shall be conducted under the observation of the Contractor's supervisory personnel complying with fingerprint regulations established by the Document: Special Conditions.
- 1.18.5.** Remove all radio or other music generating devices operated sufficiently loud so as to be objectionable, as determined solely by the Owner, to neighbors, or Owner's operations.
- 1.18.6.** Dogs and other pets are not permitted on campus without prior approval by Owner.
- 1.18.7.** No smoking or use of any tobacco products is permitted on Owner's property.
- 1.18.8.** All Contractor staff, subcontractors and suppliers shall present a professional and civil manner to staff, visitors, neighbors and students. Use of language or behavior judged offensive, obscene or suggestive by the Owner is not permitted. Clothing that is suggestive, is marked with images that suggest or promote drug, alcohol or tobacco use, or represents behavior judged offensive, obscene or suggestive by the Owner is not permitted. Immediately remove from campus any Contractor personnel exhibiting such behavior.
- 1.18.9.** Persons under the influence of or engaged in the use of drugs or controlled substances, as defined by Schedules I through V of Section 202 of the Controlled Substances Act shall be immediately removed from campus.
- 1.18.10.** Use of alcoholic beverages is prohibited on campus. Persons under the influence of or engaged in the use of alcoholic beverages shall be immediately removed from campus.
- 1.19. PROJECT IDENTIFICATION AND SIGNAGE**
- 1.19.1.** If approved by Owner, provide 4 x 8 sign, constructed of marine grade plywood, mounted on wood frame construction with concrete footings. Provide professional sign painter quality painted design and message as directed by Architect.
- 1.19.2.** Message will include project identification, name of client, architect, and contractor, and miscellaneous data.

1.19.3. Install sign at location directed by Architect. Remove at end of project and deliver to Owner.

1.19.4. No other signs are permitted except those required by law.

1.20. DOCUMENTATION OF EXISTING CONDITIONS

1.20.1. Prior to beginning any alterations, including grading, wall demolition or fixture removal, prepare a record of existing improvements affected by the work of this contract, including but not limited to the following:

1.20.1.1. Off-site street and frontage improvements, identifying all evidence of existing settlement, cracking, and other signs of damage, distress or failure.

1.20.1.2. Condition of adjacent properties, including fencing, retaining walls, pools, paving, and structures. Clearly identify all evidence of existing settlement, cracking, alignment and other signs of damage, distress or failure.

1.20.1.3. Condition of landscaping, including canopy overhang, shrubbery and grass/groundcover. Clearly identify all evidence of existing trunk damage, grass compaction, crushed and broken shrubs and other signs of distress or failure.

1.20.2. Format

1.20.2.1. Prepare record document using digital color video, recorded on DVD, and any other means of documentation necessary to describe existing condition.

1.20.2.2. Prepare digital color video at such scale and detail as required to document existing damage occurred prior to beginning work. If the record documents do not clearly show damage as a pre-existent condition, Contractor shall be responsible for repair or replacement of such damaged improvements.

1.20.3. Obtain Owners' Inspector of Record certification that documents were prepared prior to beginning construction. Deliver DVD and associated documentation to Owner prior start of construction.

1.21. USE OF EXPLOSIVES

1.21.1.1. Use of explosives is prohibited.

2. PART 2 – PRODUCTS

Not Used

3. PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01 60 00
PRODUCT REQUIREMENTS

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Products.
- 1.1.2.** Transportation and handling.
- 1.1.3.** Storage and protection.

1.2. PRODUCTS

- 1.2.1.** Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.
- 1.2.2.** Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- 1.2.3.** Provide interchangeable components of the same manufacturer, for similar components.

1.3. TRANSPORTATION AND HANDLING

- 1.3.1.** Transport and handle Products in accordance with manufacturer's instructions.
- 1.3.2.** Promptly inspect shipments to assure that Products comply with requirements, quantities are correct, and Products are undamaged.
- 1.3.3.** Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement or damage.

1.4. STORAGE AND PROTECTION

- 1.4.1.** Store and protect Products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive Products in weather-tight, climate controlled enclosures.
- 1.4.2.** Where approved by Architect and permitted by General Conditions, provide off-site storage and protection in a bonded warehouse when site does not permit on-site storage or protection.
- 1.4.3.** Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.

2. PART 2 - PRODUCTS

Not Used

3. PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01 75 00
STARTING AND ADJUSTING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Starting systems.
- 1.1.2.** Demonstration and instructions.
- 1.1.3.** Testing, adjusting and balancing.

1.2. STARTING SYSTEMS

- 1.2.1.** Coordinate schedule for start-up of various equipment and systems.
- 1.2.2.** Notify Inspector and Architect 48 hours prior to start-up of each item.
- 1.2.3.** Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence or other conditions which may cause damage.
- 1.2.4.** Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- 1.2.5.** Verify wiring and support components for equipment are complete and tested.
- 1.2.6.** Execute start-up under supervision of responsible manufacturer's representative and/or Contractor personnel in accordance with manufacturers' instructions.
- 1.2.7.** When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, and check equipment or system installation prior to start-up and to supervise placing equipment or system operation.
- 1.2.8.** Submit a written report to the Architect that equipment or system has been properly installed and is functioning correctly.
- 1.2.9.** Provide advance notice to Architect and Inspector of Record regarding all coordination for utility and service systems hook-ups.

1.3. DEMONSTRATION AND INSTRUCTIONS

- 1.3.1.** Demonstrate operation and maintenance of Products to Owner's personnel within seven (7) calendar days of Substantial Completion, prior to occupancy.
- 1.3.2.** Demonstrate Project equipment by a qualified manufacturers' representative who is knowledgeable about the Project.
- 1.3.3.** For equipment or systems requiring seasonal operation, perform demonstration for other seasons within six months.

- 1.3.4. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.
- 1.3.5. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance and shutdown of each item of equipment at agreed-upon times at equipment location.
- 1.3.6. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- 1.3.7. The amount of time required for instruction on each item of equipment and system is that specified in individual sections.

2. PART 2 - PRODUCTS

Not Used

3. PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01 77 19
CLOSEOUT REQUIREMENTS

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Closeout Procedures.
- 1.1.2.** Final Cleaning.
- 1.1.3.** Adjusting.
- 1.1.4.** Project Record Documents.
- 1.1.5.** Operation and Maintenance Data.
- 1.1.6.** Warranties.
- 1.1.7.** Spare Parts and Maintenance Materials.

1.2. SUBSTANTIAL COMPLETION AND PUNCH LIST PROCEDURES

- 1.2.1.** At such time as each Contractor believes project is substantially complete, notify Architect and request Punch List Inspection.
- 1.2.2.** Architect and Architect's Consultants will conduct an inspection in order to determine acceptance of work and identify items remaining to complete. The Architect will prepare a Punch List of such items and transmit to Contractor.
- 1.2.3.** If Architect determines that punch list items remaining are sufficiently minor, and that Owner can occupy work and use it for its intended purpose, then Architect will prepare a Notice of Substantial Completion for Owner's signature.
 - 1.2.3.1.** If work is not substantially complete, Contractor shall continue construction until such time as project status justifies subsequent inspection. Architect *and Project Manager* and Architect's Consultant costs incurred in such subsequent inspections will be paid by Contractor by Owner-Contractor contract adjustment.
 - 1.2.3.2.** Contractor shall complete all items on Punch List within 30 days, or as stated on Notice of Substantial Completion.
- 1.2.4.** Provide submittals to Architect/Owner required by governing or other authorities.

1.3. FINAL COMPLETION PROCEDURES

- 1.3.1.** At such time as Contractor believes project is complete and following completion of Punch List items, notify Architect and request Final Inspection
 - 1.3.1.1.** Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect Final inspection.

1.3.1.2. Upon receipt of request for final inspection, Architect will perform a Final Inspection and recommend actions as defined by the General Conditions.

1.3.1.3. If Architect determines work is acceptable under the Contract Documents, Contractor shall submit Final Application for Payment and close-out documents.

1.3.2. Final Application for Payment

1.3.2.1. Contractor shall submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.3.2.2. When requested by Architect, provide evidence of payment, lien releases and consent of surety to make final payment to Contractor.

1.3.2.3. The District's Board will take an action to accept the project and authorize the filing of a Notice of Completion.

1.3.2.4. Final Payment, including retention, will be released to the Contractor no sooner than 35 days following the filing of the Notice of Completion in compliance with County recording requirements, and subject to no filing of subcontractor stop notices or other claims against the District.

1.3.3. Contractor shall provide all close-out documents required by Contract Documents within ten days of the last day of the contract period.

1.3.3.1. Close out documents include, but are not necessarily limited to:

1.3.3.1.1. Project Job Set and Record Set.

1.3.3.1.2. Operational and maintenance manuals and data.

1.3.3.1.3. Warranties and Guarantees.

1.3.3.1.4. Keys and keying schedules.

1.3.3.1.5. Spare parts, extra stock and materials.

1.3.3.1.6. All jurisdictional approval documents, including Final Verified reports, certification of fire alarm and related documents.

1.4. FINAL CLEANING

1.4.1. Contactor shall conduct all final cleaning required to comply with requirements of this Section prior to final inspection.

1.4.2. Use cleaning materials which do not create hazards to health or property and which will not damage surfaces. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

1.4.3. Employ experienced workers or professional cleaners for final cleaning. Comply with instructions of manufacturer for surface being cleaned.

- 1.4.4.** Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner
- 1.4.5.** Contractor shall clean all completed interior work, including but not necessarily limited to, surfaces exposed to view in final construction, all cabinet/casework interiors and surfaces, and all equipment and fixtures.
 - 1.4.5.1.** Remove temporary labels, stains and foreign substances. Where stain cannot be removed, replace item to the satisfaction of *the Project Manager* and Architect.
 - 1.4.5.2.** Polish transparent and glossy surfaces.
 - 1.4.5.3.** Wet wipe painted and prefinished surfaces. Do not leave residue or wipe marks.
 - 1.4.5.4.** Where HVAC system was operated during construction, clean permanent filters and replace disposable filters immediately prior to final inspection. Clean ducts, blowers and coils if units were operated without filters during construction.
 - 1.4.5.5.** Perform final cleaning of all plumbing and electrical components. Polish all glossy surfaces, wet wipe all other finished exposed surfaces and elements.
- 1.4.6.** Clean all completed building exterior surfaces and site work, including but not necessarily limited to, surfaces exposed to view in final construction, all roof surfaces, all site paving surfaces, and all equipment and fixtures.
 - 1.4.6.1.** Remove temporary labels, stains and foreign substances from exterior surfaces.
 - 1.4.6.2.** Polish exterior signage components and similar glossy surfaces.
 - 1.4.6.3.** Remove dirt and dust from all exterior surfaces by approved means. Clean all sealant joints and similar applications.
 - 1.4.6.4.** Remove debris, construction products, fasteners, and trash from all roof surfaces.
 - 1.4.6.5.** Rake grounds that are neither paved nor planted to a smooth even-textured surface.
 - 1.4.6.6.** Clean all paving surfaces as necessary to remove construction dust and dirt, including debris from joints using approved methods. Remove all construction stains by approved means. Remove asphalt and seal coat splatter from curb faces.
- 1.4.7.** Remove waste and surplus materials, rubbish, and construction facilities from the site and legally dispose of.

1.5. ADJUSTING

- 1.5.1.** Adjust operating Products and equipment to ensure smooth and unhindered operation.

1.6. RECORD DOCUMENTS: RECORD SET

- 1.6.1.** Upon completion of the Work, obtain one set of reproducible drawings made from approved stamped originals from the Architect for preparation of Record Set. Cost to duplicate originals will be paid by Contractor at no further cost to Owner.
 - 1.6.1.1.** Neatly and accurately transfer data from record job set prints specified in Section 01 50 00.
 - 1.6.1.2.** Graphic quality shall be equal to that of the original document. Submit sample of drafting and graphic capability and obtain Architect's approval before proceeding with transfer.
 - 1.6.1.3.** Cost of Record Set reproducibles and all preparation shall be paid by Contractor at no additional cost to Owner.
- 1.6.2.** Sign and date Record Job Sets and Record Sets, certifying that the information and data added is accurate and complete.
- 1.6.3.** Record drawings not complying with specified criteria shall be rejected.
- 1.6.4.** Prior to submission for final payment, review Record Set with Architect and obtain approval of the scope of transfer. Following approval, submit Record Job Sets and Record Set to Architect with claim for final Application for Payment.

1.7. OPERATION AND MAINTENANCE DATA

- 1.7.1.** Submit two sets prior to final inspection, bound in 8-1/2 x 11 inch text pages, three ring binders with durable plastic covers.
- 1.7.2.** Prepare binder covers with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.
- 1.7.3.** Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- 1.7.4.** Contents: Prepare a Table of Contents for each volume, with each Product or system description identified, type on 24 pound white paper.
- 1.7.5.** Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
- 1.7.6.** Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - 1.7.6.1.** Significant design criteria.
 - 1.7.6.2.** List of equipment.
 - 1.7.6.3.** Parts list for each component.
 - 1.7.6.4.** Operating instructions.
 - 1.7.6.5.** Maintenance instructions for equipment and systems.

- 1.7.6.6. Maintenance instructions for special finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.
 - 1.7.7. Part 3: Project documents and certificates, including the following:
 - 1.7.7.1. Shop drawings and product data.
 - 1.7.7.2. Certificates.
 - 1.7.7.3. Photocopies of warranties.
 - 1.7.8. Submit one copy of completed volumes in final form 15 days prior to final inspection. This copy will be returned after final inspection, with Architect comments. Revise content of documents as required prior to final submittal.
 - 1.7.9. Submit final volumes revised, within 15 days after final inspection.
 - 1.8. WARRANTIES
 - 1.8.1. Provide duplicate notarized copies.
 - 1.8.2. Execute and assemble documents from Subcontractors, suppliers, and manufacturers.
 - 1.8.3. Provide Table of Contents and assemble in three ring binder with durable plastic cover.
 - 1.8.4. Submit prior to final Application for Payment.
 - 1.8.5. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.
 - 1.9. SPARE PARTS AND MAINTENANCE MATERIALS
 - 1.9.1. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification Sections.
 - 1.9.2. Deliver to Project site and place in location as directed; obtain receipt prior to final payment.
 - 2. PART 2 - PRODUCTS

Not used
 - 3. PART 3 - EXECUTION

Not used

END OF SECTION

SECTION 01 91 00

COMMISSIONING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Section includes building commissioning requirements; coordinate with mechanical and electrical requirements.

1.1.1.1. Project includes special facility start-up process used to bring facility to a fully operational state, substantially free of deficiencies, in an efficient and timely manner.

1.2. DESCRIPTION

1.2.1. Following definitions apply to all Contract Documents.

1.2.1.1. "Contractor Start-Up" means sub-phase of Contractor's work ending with Acceptance of Work, during which Contractor performs a pre-planned program of activities including starting, testing, inspecting, adjusting, balancing, correcting Contract deficiencies, and other similar activities.

1.2.1.1.1. During this period the Architect, Architect's consultants, and Inspector or Owner's designated representative shall be on site to observe, inspect and identify deficiencies in system operation.

1.2.1.2. "Completion of Startup" means when entire Work, including Contractor Startup and Fine Tuning, except those items arising from warranty provisions of Contract Documents, has been performed to requirements of Contract Documents and is so declared, in writing, by Architect and Architect's consultants.

1.2.1.3. "Fine Tuning" means sub-phase of Contractor's work, commencing after occupancy and ending twelve months later, during which Architect, Architect's consultants, and Owner identifies Contract deficiencies arising under normal operating conditions, after user occupancy, and Contractor corrects such Contract deficiencies.

1.2.1.3.1. Fine Tuning is period after occupancy of facility by User during which systems are optimized under "live" operating conditions and any outstanding construction or design deficiencies are corrected.

1.2.1.3.2. For purposes of these documents "Fine Tuning" shall extend from date of actual User occupancy of building to a date twelve months after date of actual User occupancy.

1.2.1.4. "Acceptance of Work" means when prerequisites to Acceptance of Work required by Contract Documents are fulfilled and Work is ready for use or is being used for purpose intended and state of work is so declared, in writing, by Owner.

1.2.2. Commissioning Schedule:

1.2.2.1. Provide schedules for Contractor Start-Up work.

1.2.2.2. Incorporate in overall construction schedule.

1.2.2.3. Contractor's activities, which will be performed as specified under Fine Tuning, shall be completed within 12 months from date of occupancy by User.

1.3. SUBMITTALS

1.3.1. Submit draft and final Contractor Start-Up Report Forms as described in Part 3 of this Section.

2. PART 2 - PRODUCTS

//Not Used

3. PART 3 - EXECUTION

3.1. CONTRACTOR START-UP REPORT FORMS

3.1.1. Prepare and submit one copy of report forms to be used in preparation of system reports for plumbing, mechanical and electrical systems.

3.1.2. Each system report shall include following:

3.1.2.1. Project name.

3.1.2.2. Name of system.

3.1.2.3. Index of report's content.

3.1.2.4. List of equipment in system.

3.1.2.5. Adjacent to list of equipment, columns to indicate status of equipment operation, to date and to sign off equipment start-up.

3.1.2.6. Space to record equipment and operational problems which cannot be corrected within scheduled Contractor Start-Up program, and which may delay Acceptance of Work.

3.1.2.7. Manufacturers' equipment start-up reports.

3.1.2.8. Systems' testing, balancing, and adjusting reports.

3.1.2.9. Equipment report forms, which shall include:

3.1.2.9.1. Project name.

3.1.2.9.2. Name of equipment.

3.1.2.9.3. Starting and testing procedures to be performed.

3.1.2.9.4. Observations and test results to be recorded.

3.1.3. Submittals:

- 3.1.3.1.** Submit draft report forms for Architect review and comment prior to final submission. Coordinate draft submissions with Architect.
- 3.1.3.2.** Submit final report forms, acceptable to Architect not later than ten weeks before scheduled date of Acceptance of Work.

3.2. PRE-FACILITY START-UP MEETINGS

- 3.2.1.** Pre-Facility Start-Up meetings shall be held from start of Work until Contractor Start-Up schedules and Contractor Start-Up report forms have been approved by Architect.
- 3.2.2.** Purpose: To monitor development of Contractor Start-Up schedule and Contractor Start-Up report forms.
- 3.2.3.** Frequency: As directed by Architect until Contractor Start-Up schedule and Contractor Start-Up report forms are approved by Architect.
- 3.2.4.** Location: On-site location agreed to between Owner, Architect, and Contractor.
- 3.2.5.** Attendees:
 - 3.2.5.1.** Contractor's Representatives: Contractor's site superintendent, mechanical and electrical subcontractors, and when so requested by Architect, Sub-subcontractors, suppliers and other parties involved in Work. Contractor's representatives shall be qualified and authorized to act on behalf of party each represents.
 - 3.2.5.2.** Architect, Architect's consultants, and Owner's representatives.
- 3.2.6.** Minutes: Contractor shall record minutes and distribute copies to all attendees within seven days after meeting.

3.3. FACILITY START-UP

- 3.3.1.** Contractor Responsibilities During Facility Start-Up (Not necessarily in order listed):
 - 3.3.1.1.** Start equipment and systems as specified in individual Sections in the Project Manual, including Divisions 21 through 28.
 - 3.3.1.2.** Test, adjust and balance equipment and systems as specified.
 - 3.3.1.3.** Demonstrate equipment and systems as specified.
 - 3.3.1.4.** Complete and submit Contractor Start-Up reports including:
 - 3.3.1.4.1.** Contractor's system and equipment start-up reports.
 - 3.3.1.4.2.** Testing, adjusting and balancing reports.
 - 3.3.1.4.3.** Manufacturers' equipment start-up reports.
 - 3.3.1.5.** Review Contract Documents and inspect Work to ensure completeness of Work and compliance with requirements of Contract Documents.

3.3.1.6. Correct Contract deficiencies identified as a result of foregoing and as may be identified by Owner.

3.3.2. Architect and Architect's consultants, Responsibilities During Facility Start-Up.

3.3.2.1. Carry out pre-interim inspections as necessary.

3.3.2.2. Witness manufacturers' equipment start-ups.

3.3.2.3. Verify starting, testing, adjusting and balancing by Contractor.

3.3.2.4. Review and approve Contractor Start-Up reports.

3.3.2.5. Cooperate in systems and equipment demonstration and instruction.

3.3.3. Owner Responsibilities During Facility Start-Up.

3.3.3.1. Verify correction of Contract deficiencies by Contractor.

3.3.3.2. Verify execution of Change Orders by Contractor.

3.3.4. Ongoing Cycle of Facility Start-Up Includes:

3.3.4.1. Architect and Architects consultants, inspections.

3.3.4.2. Documentation of results.

3.3.4.3. Diagnosis of problems.

3.3.4.4. Correction of Contract deficiencies and execution of Change Orders as required.

3.3.4.5. Verification of results.

3.4. FINE TUNING

3.4.1. Fine tuning will commence upon Acceptance of Work.

3.4.2. Contractor Responsibilities During Fine Tuning:

3.4.2.1. Correct Contract deficiencies previously outstanding and those identified during Fine Tuning.

3.4.2.2. Where Contractor startup has been properly implemented, construction and design deficiencies left to be resolved during this period should be relatively minor.

3.4.2.2.1. Ensure expedient correction of minor problems which are identified during initial occupancy.

3.4.2.2.2. Attend regular weekly meetings with Users to review any operational problems.

3.4.2.2.3. Make necessary environmental measurements and survey users to quickly identify problems and establish necessary trade inputs for resolution.

- 3.4.2.2.4. Monitor and manage prompt correction of Contract deficiencies identified during initial user occupancy.
- 3.4.2.2.5. Find and eliminate deficiencies in systems and equipment performance.
- 3.4.2.2.6. Complete work on all fine tuning issues within first 12 months from the date of completion.
- 3.4.3. Architect and Architect's consultants, Responsibilities During Fine Tuning:
- 3.4.3.1. Carry out a series of systems and equipment operating tests under conditions simulating, to extent possible, full and partial operating loads.
- 3.4.3.2. Record test results.
- 3.4.3.3. Diagnose problems.
- 3.4.3.4. Observe repeat tests as required following correction of Contract deficiencies.
- 3.4.4. Ongoing Cycle of Fine Tuning Includes:
- 3.4.4.1. Performance testing.
- 3.4.4.2. Documentation of results.
- 3.4.4.3. Diagnosis of problems.
- 3.4.4.4. Correction of Contract deficiencies and execution of Change Orders as required.
- 3.4.4.5. Verification of results.
- 3.5. PREREQUISITES TO COMPLETION OF START-UP FINE TUNING
- 3.5.1. Prerequisites to Completion of Fine Tuning Work are:
- 3.5.1.1. Prior Acceptance of Work.
- 3.5.1.2. Completion of Fine Tuning activities by Architect, Architect's consultants, and Contractor as specified.
- 3.5.1.3. Contract deficiencies identified during Fine Tuning testing and previously identified but outstanding Contract deficiencies shall have been corrected by Contractor or addressed adequately by Contractor so course of action can be established by Architect.
- 3.5.1.4. Ensure entire work, except items arising from warranty provisions of Contract Documents, has been performed to requirements of Contract Documents.

END OF SECTION

SECTION 02 41 19

SELECTIVE BUILDING DEMOLITION AND RENOVATION

1. PART 1 - GENERAL

1.1. WORK INCLUDED

- 1.1.1. Remove designated building equipment and fixtures.
- 1.1.2. Remove designated doors and frames.
- 1.1.3. Remove electrical systems and components required to implement the work of this contract. Reinstall or replace as shown on drawings..
- 1.1.4. Remove mechanical and plumbing systems and components required to implement the work of this contract. Reinstall or replace as shown on drawings
- 1.1.5. Renovate designated doors and frames.
- 1.1.6. Repair and renovate existing surfaces in preparation for final finish, and as necessary to restore to original functional condition.
- 1.1.7. Salvage of existing finishes, equipment and components where shown, and relocation of existing building equipment and fixtures to permit demolition and renovation operation.
- 1.1.8. Disposal of debris and rubbish.

1.2. SUBMITTALS

- 1.2.1. Demolition Schedule: Provide schedule, illustrating demolition schedule, utility disconnect/connection schedule, coordination with roofing system installation, and all other aspects of the work.
 - 1.2.1.1. Coordinate schedule with *District*.
- 1.2.2. Certification:
 - 1.2.2.1. Provide certification that all required permits, disposal site location and arrangements for transportation and disposal have been obtained.

1.3. QUALIFICATIONS

- 1.3.1. Demolition Firm:
 - 1.3.1.1. Company specializing in performing work of this Section with minimum 5 years documented experience.

1.4. PRE-INSTALLATION CONFERENCE

- 1.4.1. Convene a pre-installation conference one week prior to commencing work of this Section and under provisions of Section 01 31 13. Attendance by installers of adjacent work affected by work of this section is mandatory.

- 1.4.2.** Review adjacent work installation procedures and coordination required with work of this Section.

1.5. ENVIRONMENTAL REQUIREMENTS

- 1.5.1.** Do not remove existing exterior envelope systems when weather conditions threaten the integrity of the building, contents, or intended continued occupancy.
- 1.5.2.** Maintain continuous temporary protection during, and prior to, installation of new exterior envelope systems.
- 1.5.3.** Do not perform any demolition activities when building is occupied.

1.6. COORDINATION AND SCHEDULING

- 1.6.1.** Coordinate work under provisions of Section 01 11 00 and 01 31 13.
- 1.6.2.** Schedule work to coincide with commencement of installation of new exterior envelope systems.
- 1.6.3.** Unless otherwise scheduled, remove only that amount of existing exterior envelope systems that can be protected or replaced prior to completion of each day's work.
- 1.6.4.** Coordinate work with affected mechanical and electrical work associated with exterior penetrations.
- 1.6.5.** Superintendent shall be present on job at all times.
- 1.6.6.** Schedule equipment and storage areas on Project site, approved by Construction Manager.

1.7. EXISTING CONDITIONS

- 1.7.1.** Conduct demolition to minimize interference with adjacent buildings. Maintain protected egress and access at all times.
- 1.7.2.** Provide, erect, and maintain temporary barriers and security devices as necessary to provide safe pathways, maintaining continuous separation of construction activity from areas occupied by visitors, users and staff.
- 1.7.3.** Contractor shall comply with all applicable laws and ordinances regarding hazardous materials, including lead based coatings.

2. PART 2 - PRODUCTS

2.1. PRODUCTS FOR PATCHING AND EXTENDING WORK

- 2.1.1.** General:
 - 2.1.1.1.** Unless noted otherwise, provide products matching existing finish, color, dimension, and assembly.
 - 2.1.1.2.** All products shall be new, unless specifically noted otherwise.
 - 2.1.1.3.** Provide asbestos free materials.
 - 2.1.1.4.** Maintain all fire resistance ratings of existing assemblies and materials.

- 2.1.1.5.** Maintain water and weather tight characteristics of assemblies and materials.
- 2.1.2.** Comply with requirements as specified in applicable specification sections for materials used in repairing and extending existing work.
- 2.2. OWNERS SALVAGED ITEMS**
- 2.2.1.** Products, fixtures and equipment designated as salvage for Owners use are shown on drawings. Where designated, comply with the following requirements.
- 2.2.2. Owners Representative's Responsibilities:**
- 2.2.2.1.** Identify and tag in place all items designated as Owners salvage items.
- 2.2.2.2.** Arrange and designate location for delivery of salvaged items.
- 2.2.2.3.** On delivery, inspect items jointly with Contractor, and identify any damage resulting from Contractors negligent handling or transportation.
- 2.2.2.4.** Arrange for all storage, security and maintenance of salvaged items after delivery.
- 2.2.3. Contractor's Responsibilities:**
- 2.2.3.1.** Review all items designated as salvage. Prepare summary report of condition of each item, establishing general surface condition and quality, functional status, inventoried spare parts and supplies, and related description. Obtain Owners Representatives approval of summary report.
- 2.2.3.2.** Remove designated items as specified below.
- 2.2.3.3.** Properly prepare salvaged items for transport and storage.
- 2.2.3.4.** Provide all required equipment to load, transport and off-load at location designated by Owners Representative. Coordinate time and delivery schedule.
- 2.3. MINOR DRYWALL AND PLASTER REPAIR MATERIALS**
- 2.3.1.** In areas where work requires minor access to or penetration of existing surfaces, provide all materials, including lath and accessories, for repairing and filling voids in existing drywall and plaster interior surfaces.
- 2.3.1.1.** Material shall contain no asbestos.
- 2.3.1.2.** Provide assembly thickness, construction and finish equal to existing finish.
- 2.3.1.3.** Comply with Section 09 21 16 of this Project Manual.
- 2.3.1.4.** Provide gypsum board systems in accordance with applicable portions of Section 09 21 16 of this Project Manual.
- 2.4. WALL FRAMING AND SHEATHING MATERIALS**
- 2.4.1.** Provide framing and sheathing materials complying with Section 06 10 53.

2.5. CONCRETE SLAB REPAIR MATERIALS

2.5.1. Provide concrete patching materials in accordance with Section 03 99 20.

2.6. TEMPORARY PROTECTION PRODUCTS

2.6.1. Provide fire retardant reinforced polyethylene sheeting, 6 mil minimum thickness.

2.7. OTHER MATERIALS

2.7.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. DOCUMENTATION OF EXISTING CONDITIONS

3.2.1. Prior to beginning any alterations, including surface demolition or fixture removal, prepare a record of existing improvements affected by the work of this contract, including but not limited to the following:

3.2.1.1. Exterior paving improvements, identifying all evidence of existing settlement, cracking, and other signs of damage, distress or failure.

3.2.1.2. Condition of adjacent construction designated to remain, including finish materials. Clearly identify all evidence of existing settlement, cracking, alignment and other signs of damage, distress or failure.

3.2.2. Format

3.2.2.1. Prepare record document using digital color DVD, with verbal annotation describing location and condition, and any other means of documentation necessary to describe existing condition.

3.2.2.2. Prepare DVD at such scale and detail as required to document existing damage occurred prior to beginning work. If the record documents do not clearly show damage as a pre-existent condition, Contractor shall be responsible for repair or replacement of such damaged improvements.

- 3.2.2.3.** Obtain Owners' Inspector of Record certification that documents were prepared prior to beginning construction. Deliver DVD and associated documentation to Owner prior start of construction.

3.3. PREPARATION

- 3.3.1.** Erect and maintain temporary partitions to prevent spread of dust, fumes, noise, and smoke under the provisions of Section 01500 and to provide for occupancy as specified in Section 01 11 00.
- 3.3.2.** Protect existing items not designated for removal.
 - 3.3.2.1.** Protect existing surfaces of adjacent buildings with barriers, protective panels, tarps and other devices as necessary to avoid damage.
- 3.3.3.** Where Owners Representative has given approval to take fire detection system off-line, deactivate system prior to beginning work. Return system to active status at completion of work or at completion of each work period.
 - 3.3.3.1.** Coordinate with Owners Representative and integrate into all schedules.
 - 3.3.3.2.** Maintain continuous fire watch in accordance with regulatory agency direction during fire detection system deactivation.
- 3.3.4.** Repair all underground utilities and services damaged during construction, including utilities and services documented by Contractor at no additional cost to Owners Representative.

3.4. UTILITY AND BUILDING SERVICES REMOVAL AND RE-INSTALLATION

- 3.4.1.** Where encountered, remove conduit and conductors, piping, drains, and other associated system components within the limits of the work and not covered by other requirements of the contract documents. Include all utilities and services documented by Contractor.
- 3.4.2.** Utility and Service Termination
 - 3.4.2.1.** Locate and identify existing utility, service and irrigation system components affected by work of this contract. Review existing record drawings, conduct site investigations, contact Underground Service Alert and other qualified cable/pipe/line locator services, and implement all other means necessary to define the location of underground systems.
 - 3.4.2.2.** Prior to beginning any demolition, properly disconnect all water, gas and electrical power supply at appropriate disconnect locations. Obtain all necessary releases and approvals from serving utility companies.
 - 1.1.1.1.** Work under this contract requires renovation or removal and replacement of existing roof and wall systems. Prior to beginning work, provide Owners Representative with plan to maintain existing utility systems in operation without disruption during such work. Provide temporary support, relocation or shunt/parallel service for all existing utility systems required to remain in operation.
 - 3.4.2.3.** Prior to demolition or disconnect, obtain Owners Representatives approval that such system does not impact facilities or systems beyond the extent of this contract.

3.4.2.4. Mark location of disconnected systems. Identify and indicate stub-out locations on Project Record Documents.

3.4.3. Coordinate the time and duration of all system disconnects with Owners Representative.

3.4.4. Erect and maintain temporary partitions to prevent spread of dust, fumes, noise, and smoke under the provisions of Section 01 50 00.

3.4.5. Remove all conductors from conduit at all abandoned electrical circuits.

3.4.6. Seal off ends of all piping, drains and other components as directed by Architect and serving utility.

3.4.7. Where necessary to maintain service to existing utility and building systems, relocate or redirect all conduit and conductors, piping, drains, and associated system components.

3.4.7.1. Re-circuit all electrical as required.

3.5. DEMOLITION

3.5.1. Demolish components in an orderly and careful manner.

3.5.1.1. Limit heavy equipment used to perform demolition and to transport debris as specified in other contract documents.

3.5.1.2. Use enclosures to minimize airborne dust and debris.

3.5.2. Coordinate with Owners Representative the time of day and route to remove demolished materials from premises.

3.5.3. Remove items designated as salvage in manner to prevent damage. Store and protect under provisions of [Article 2.2](#) of this Section and as follows:

3.5.3.1. Verify all items are "safed off" prior to removal.

3.5.3.2. Remove all components subject to breakage, such as glass, bulbs, retainers and similar parts and accessories. Properly label and prepare for transport.

3.5.3.3. Prepare all items for safe transport. Where appropriate, drain fixtures of non-essential fluids.

3.5.3.4. Salvage and store with item all fasteners, anchors, closure panels, and related components. Prepare diagrams and label such components as necessary for future reassembly or installation.

3.5.4.

3.5.5. Unless designated as salvage on drawings, all remaining items to be demolished or removed are designated as scrap and become the property of the Contractor.

3.5.6. Remove demolished materials from site as work progresses. Upon completion of work, leave areas of work in clean condition.

3.5.7. Fixture and Equipment Removal:

3.5.7.1. All existing building system equipment shall be removed as identified and shown on drawings and required by Architect.

- 3.5.7.2.** Prior to beginning any system removal, properly disconnect all water, gas and electrical power supply at appropriate disconnect locations. Obtain all necessary releases and approvals from serving utility companies.
- 3.5.7.3.** Where designated as demolished, remove all accessible conduit and conductors, piping, drains, and other associated building system components located above grade. Remove all conductors from conduit at all abandoned circuits, including those in concealed spaces above grade.
- 3.5.8.** Remove concrete slab by saw-cutting. At areas where existing curb or wall line prevents saw use, carefully jack-hammer concrete slab as required to provide new concrete. Saw cut all reinforcing bars - Do not torch.
- 3.5.9.** Remove, store, protect and re-install existing materials and equipment as shown on drawings.

3.5.9.1. EXTERIOR ENVELOPE SYSTEM DEMOLITION

- 3.5.10.** Demolition of exterior wall window assemblies
 - 3.5.10.1.** Remove exterior windows, including screens, flashing, sill covers and hardware. Remove to supporting substrate/structure, including all underlayment, accessory trim, clips, battens and closures.
 - 3.5.10.2.** Remove all fasteners, screws and attachment hardware.
- 3.5.11.** Demolition of exterior wall door frames and doors.
 - 3.5.11.1.** Remove exterior door frames. Remove to supporting substrate/structure, including all flashing, accessory trim, clips, and closures.
 - 3.5.11.2.** Remove exterior doors, including all door hardware and thresholds. Salvage for Owners use.
- 3.5.12.** Upon completion of work, leave areas of work in clean condition per Section 01 50 00.
- 3.5.13.** Termination of isolated pipe or conduit penetrations:
 - 3.5.13.1.** Terminate all penetrations below slab surface. Remove concrete slab as close as possible to penetration by saw-cutting. Saw cut all reinforcing bars - Do not torch.
 - 3.5.13.2.** Seal or cap all penetrations in Architect approved manner.
 - 3.5.13.3.** Provide non-shrink portland cement grout fill complying with Section 03 33 10 to slab level, troweled smooth.
- 3.5.14.** Slab on grade demolition and replacement.
 - 3.5.14.1.** Comply with this Section for repair of slab at isolated penetrations.
 - 3.5.14.2.** Carefully sawcut and remove existing slab (including bonded finishes where applicable) at locations as shown on drawings or required to implement work under this contract. Coordinate with work shown on plumbing and electrical drawings. Protect existing adjacent finish flooring designated to remain.

- 3.5.14.3.** Remove approximately 3 inches of existing grade or base below bottom of slab elevation, extending each side of sawcut approximately 2 inches.
- 3.5.14.4.** Roughen cut face of slab, and chip bottom edge back at approximately 45 degrees.
- 3.5.14.5.** Apply bonding agent specified in Section 03 33 10 to face of existing concrete.
- 3.5.14.6.** Place polymer modified concrete fill as specified in Section 03 33 10. Trowel slab surface as specified for subsequent floor finish materials.
- 3.5.15.** Where slab replacement exceeds 12 feet in any direction, provide tooled control joint at approximately 6 feet on center at right angles to saw-cut.

3.6. EXISTING EXTERIOR WALL AND ROOF FRAMING REPAIR

- 3.6.1.** Examine existing wall and roof framing after removal of exterior wall finishes as specified in this section.
- 3.6.2.** Identify plywood sheathing, framing elements, connectors and other components of the wall and roof assembly exhibiting defects or damage, including the following:
 - 3.6.2.1.** Split or delaminated veneer.
 - 3.6.2.2.** Crushed panel edges, panel gaps exceeding 1/8 inch, open "boats", and panel edges displaced more than 1/8 inch.
 - 3.6.2.3.** Evidence of dry-rot, mold, embrittlement or other organic defects in sheathing and framing.
 - 3.6.2.4.** Rusted, corroded, missing or defective fasteners.
- 3.6.3.** Obtain direction from Architect on repair or removal of identified defects.
- 3.6.4.** Where repairs or replacement is necessary, a contract adjustment will be made for direct cost and schedule impact of such work. However, no cost increase will be accepted for consequential or indirect costs.

3.7. BUILDING SYSTEM COMPONENTS

- 3.7.1.** Protect ceiling mounted HVAC registers, ductwork, and related system components in place as defined on drawings.
- 3.7.2.** Modify existing main ductwork, plenum, louver and control components as shown on drawings.
- 3.7.3.** Protect interior plumbing fixtures in place as defined on drawings. Where located in casework shown as removed, remove plumbing fixtures as shown on drawings.
- 3.7.4.** Protect ceiling mounted interior light fixtures in place as defined on drawings.
- 3.7.5.** Remove electrical device covers, including switchplates, outlet covers and similar components as defined on drawings.
- 3.7.6.** Remove exterior light fixtures as defined on drawings.

3.8. PAINTING

- 3.8.1.** Paint repaired surfaces as required or at locations shown on drawings.
- 3.8.2.** Prepare existing surface as recommended by manufacturer for substrate. Clean off all dirt, dust, and oily films.
- 3.8.3.** Paint existing surface with specified coatings. Unless noted otherwise on drawings, paint entire surface where crack repair occurs. Painting crack repair only is not acceptable.
- 3.8.4.** Provide one coat of specified primer, and two coats of specified finish paint.

3.9. DISPOSAL

- 3.9.1.** Dispose of all demolished material, trash, debris, and other materials not used in the work in accordance with the regulations of jurisdictional authority. Remove demolished materials and debris from site on a daily basis.

3.10. ADJACENT CONSTRUCTION

- 3.10.1.** Take particular care at connection between structures designated to remain. Use hand tools only to remove all portions designated as demolished.
- 3.10.2.** Where foundations occur adjacent to demolished structure, provide all required underpinning or shoring support.
- 3.10.3.** Provide appropriate wall and roof repair detailing to maintain long term water and weather-proof assembly at structures designated to remain.
 - 3.10.3.1.** Maintain fire resistance of original assembly. Maintain materials and finishes of original assembly.
 - 3.10.3.2.** Provide multiple materials, lapped and counterflashed as required to properly shed water without creating traps.

END OF SECTION

SECTION 03 11 00
CONCRETE FORMING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Formwork for cast-in-place concrete.
- 1.1.2.** Openings for other work.
- 1.1.3.** Form accessories.
- 1.1.4.** Form stripping.

1.2. REFERENCES

- 1.2.1.** ACI 347 – Guide to Formwork for Concrete.
- 1.2.2.** PS - 1 - Construction and Industrial Plywood.

1.3. QUALITY ASSURANCE

- 1.3.1.** Perform Work in accordance with ACI 347.

1.4. COORDINATION

- 1.4.1.** Coordinate work under provisions of Section 01 31 13.
- 1.4.2.** Coordinate this Section with other Sections of work which require attachment of components to formwork.

1.5. PRODUCT HANDLING

- 1.5.1.** On delivery to Project Site, place materials in area protected from weather.
- 1.5.2.** Store materials above ground on framework or blocking and cover with protective waterproof covering providing for adequate air circulation and ventilation. Handle materials to prevent damage.

2. PART 2 - PRODUCTS

2.1. WOOD FORM MATERIALS

- 2.1.1.** Formwork Re-Use Criteria
 - 2.1.1.1.** Provide all new materials.
 - 2.1.1.2.** Materials may be reused during the progress of the work, provided surface finish, formwork quality and structural capability are maintained.
 - 2.1.1.3.** Completely clean and recondition all reused formwork materials. Recoat for each reuse.

- 2.1.2.** Softwood Plywood - Vertical and horizontal surfaces.
 - 2.1.2.1.** Grade Certification: APA Grade stamped, complying with PS-1.
 - 2.1.2.2.** Type: APA Plyform, Exterior Type.
- 2.1.3.** Lumber: Provide Douglas Fir, standard or better grade, 2 inch nominal thickness, dressed S4S.

2.2. FORMWORK ACCESSORIES

- 2.2.1.** Form Ties:
 - 2.2.1.1.** Exposed Condition: Snap-off type, fixed length, cone type, 1 inch back break dimension, free of defects that could leave holes larger than one inch in concrete surface; provide semi-recessed plugs for cone holes.
- 2.2.2.** Form Release Agent: Cresset or equal, colorless, water based material which will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.
 - 2.2.2.1.** Select type suitable and appropriate for achieving CCS 4 surface at concealed concrete applications.
- 2.2.3.** Corners: Chamfered, rigid plastic or wood strip type; 3/4 x 3/4 inch size; maximum possible lengths.
- 2.2.4.** Sleeves for pipe penetrations: Corrosion Resistant metal/Polyvinyl Chloride pipe, size as required for necessary clearances and installation of sealants.
- 2.2.5.** Nails, Spikes, Lag Bolts, Through Bolts, and Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
- 2.2.6.** Form Stakes: Steel bar stock, pre-drilled for nails.
- 2.2.7.** Formwork Panel Edge: Provide foam edge stripping at exposed formwork panel edges to minimize mortar leakage.

2.3. OTHER MATERIALS

- 2.3.1.** Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

- 3.1.1.** Inspection
 - 3.1.1.1.** Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
 - 3.1.1.2.** Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

- 3.1.1.3.** In the event of discrepancy, immediately notify the Architect.
- 3.1.1.4.** Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. EARTH FORMS

- 3.2.1.** Earth forms may be used for footings and grade beams where soil is stable. Any exposed footings shall be formed.
- 3.2.2.** Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete. Increase width of earth formed members one inch each side.
- 3.2.3.** Construct wood edge forms, as specified below, to extend not less than 2 inches below soil level. Do not permit stakes to extend into or through footing zone. Form all concrete without penetrating footing concrete.
- 3.2.4.** Fill over-excavated footings and foundations with concrete at no additional contract cost.
- 3.2.5.** Excavate as necessary to accommodate installation and removal of formwork.
- 3.2.6.** Fill voids resulting from collapse or sloughing of foundation excavation and sidewalls with concrete at no additional contract cost.
- 3.2.7.** Prior to pouring footings or foundations, remove all debris, loose material, and water from excavation.
 - 3.2.7.1.** Where water has accumulated in excavation, obtain Architects and Geotechnical Engineers review of the suitability of sub-grade condition.
 - 3.2.7.2.** Repair sub-grade as required by Geotechnical Engineer at no additional contract cost.
 - 3.2.7.3.** Do not place concrete on mud or saturated soils.

3.3. ERECTION - FORMWORK

- 3.3.1.** Erect formwork to achieve design requirements, in accordance with requirements of ACI 347.
- 3.3.2.** Formwork bracing and supports:
 - 3.3.2.1.** Provide bracing to ensure stability of formwork.
 - 3.3.2.2.** Do not permit form stakes to extend into or through footing zone. Form all concrete without penetrating footing concrete.
 - 3.3.2.3.** Provide top form at inclined surfaces where slope is too steep for concrete placement without sagging or sloughing.
- 3.3.3.** Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Provide crush plates or other approved guards where stripping operation may damage concrete. Kerf wood inserts to permit easy removal.
- 3.3.4.** Chamfer exposed corners. Seal Joints between chamfer and form panel. Miter chamfer strips at changes in direction.

3.3.5. Plywood Lay-out:

3.3.5.1. Place plywood panels with horizontal joints level, vertical joints plumb.

3.3.5.1.1. Unless noted otherwise, place panel edge at center of surface and extend in equal dimension in each direction.

3.3.5.1.2. Set form tie so that visible cones are placed in a uniform and aligned pattern. Maintain cones level and vertically aligned.

3.3.5.2. Keep form joints to a minimum. Use maximum size panels.

3.3.5.3. Back all joints by a stud or solid blocking, and provide shaped filler where necessary for smoothness. Provide foam form edge stripping to prevent grout washout.

3.3.5.4. Reused panels shall be thoroughly cleaned, damaged edges or surfaces repaired, and both sides and edges coated with specified material.

3.3.5.5. Nail plywood along edges and to intermediate supports with common wire nails spaced as necessary to maintain alignment and prevent warping.

3.3.6. Openings in structural members which are not indicated on Drawing are not permitted.

3.3.7. Depressions and transitions: Review all drawings and identify all areas requiring depressions and transitions. Coordinate with work in other sections to verify required depth and profile prior to setting forms.

3.4. APPLICATION - FORM RELEASE AGENT

3.4.1. Apply form release agent on formwork in accordance with manufacturer's recommendations.

3.4.2. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

3.4.3. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces wet prior to placement of concrete.

3.5. INSERTS, EMBEDDED PARTS, AND OPENINGS

3.5.1. Provide formed openings where required for items to be embedded in or passing through concrete work.

3.5.2. Locate and set in place items which will be cast directly into concrete.

3.5.2.1. Set all anchor bolts, hold downs and related embeds with plywood templates, anchored to formwork as required to maintain in alignment and position during concrete placement.

3.5.3. Coordinate work of other Sections in forming and placing openings, slots, reglets, recesses, chases, sleeves, bolts, anchors, and other inserts.

3.5.4. Install accessories in accordance with manufacturer's instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.

- 3.5.5.** Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
 - 3.5.6.** Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.
- 3.6. FORM CLEANING**
 - 3.6.1.** Clean and remove foreign matter within forms as erection proceeds.
 - 3.6.2.** Clean formed cavities of debris, prior to placing concrete.
 - 3.6.3.** Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
- 3.7. FORMWORK TOLERANCES**
 - 3.7.1.** Construct formwork to maintain tolerances required by ACI 347.
- 3.8. FIELD QUALITY CONTROL**
 - 3.8.1.** Erected formwork, shoring, and bracing will be inspected under the provision of Section 01 45 29 to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.
 - 3.8.2.** Request inspection, 48 hours prior to placing concrete.
 - 3.8.3.** Unless otherwise specified, do not reuse wood formwork for concrete surfaces to be exposed to view. Do not patch formwork.
 - 3.8.4.** Deformation of formwork under load causing finish surface to be out of line, level, or plumb will be cause for rejection of concrete and subsequent removal.
- 3.9. FORM REMOVAL**
 - 3.9.1.** Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads, and in accordance with the following:
 - 3.9.1.1.** Walls: Maintain forms for a minimum of 1 day.
 - 3.9.2.** Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
 - 3.9.3.** Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.
 - 3.9.4.** Plug exposed snap tie holes as specified in Section 03 30 10.
 - 3.9.5.** Plug taper tie holes with approved cement grout.
 - 3.9.6.** Grout concealed form holes as specified in Section 03 30 10.
 - 3.9.7.** Remove and finish fiberglass form tie per manufacturer's recommendations.

END OF SECTION

SECTION 03 20 00
CONCRETE REINFORCING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Reinforcing steel bars, wire fabric and accessories for cast-in-place concrete.

1.2. REFERENCES

- 1.2.1.** ACI 318 - Building Code Requirements for Structural Concrete.
- 1.2.2.** ACI SP-66 - American Concrete Institute-Detailing Manual.
- 1.2.3.** ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- 1.2.4.** CRSI - Concrete Reinforcing Steel Institute Manual of Practice.
- 1.2.5.** CRSI - Placing Reinforcing Bars (8th ed.)

1.3. SUBMITTALS

- 1.3.1.** Submit under provisions of Section 01 33 00.
- 1.3.2.** Test Reports: Submit certified copies of mill test report of reinforcing steel analysis indicating products meet or exceed specified requirements. Include grades, physical and chemical properties.
- 1.3.3.** Shop Drawings
- 1.3.3.1.** Submit steel reinforcement shop drawings in accordance with ACI 315. Include placing drawings, assembly diagrams, bending charts and slab plans. Show length and locations of splices, size and length of reinforcing steel, and stirrup spacing.

1.4. QUALITY ASSURANCE

- 1.4.1.** Perform Work in accordance with CRSI, ACI 315, and ACI 318.

1.5. QUALIFICATIONS

- 1.5.1.** Manufacturer
- 1.5.1.1.** Manufacturer shall have produced the specified products for a period of five (5) years prior to beginning work of this section, and shall have the capability to produce the specified products to the delivery and quantity criteria of the project.
- 1.5.1.2.** Unless noted otherwise, reinforcing steel may be of domestic or imported origin, subject to compliance with specified criteria.
- 1.5.2.** Fabricator/Erector

1.5.2.1. For fabrication and installation of work, use only personnel who are thoroughly trained and experienced in the skills required, have installed similar applications of the specified products within one year prior to beginning work on this section, and who are completely familiar with the requirements of this work.

1.5.3. Detailer

1.5.3.1. For detailing of reinforcing steel shop drawings, use only personnel who are thoroughly trained and experienced in the skills required.

1.6. COORDINATION

1.6.1. Coordinate work under provisions of Section 01 31 13.

1.6.2. Coordinate with placement of formwork, formed openings and other Work.

1.7. PRODUCT HANDLING

1.7.1. Deliver reinforcement to the Project Site bundled, tagged and marked. Indicate on tags, bar size, lengths, and other information corresponding to markings shown on placement diagrams.

1.7.2. Store materials at the Project Site to prevent damage and accumulation of dirt and excessive rust.

2. PART 2 - PRODUCTS

2.1. REINFORCEMENT

2.1.1. Reinforcing Steel:

2.1.1.1. ASTM A 615, deformed billet steel bars, plain finish.

2.1.1.1.1. Grade 60.

2.2. ACCESSORY MATERIALS

2.2.1. Tie Wire: Minimum 16 gage annealed type.

2.2.2. Chairs, Bolsters, Bar Supports and Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions.

2.3. FABRICATION

2.3.1. Fabricate concrete reinforcing in accordance with CRSI Manual of Standard Practice, ACI 315, and ACI 318.

2.3.2. Do NOT bend or straighten bars in manner that will weaken or injure bar.

2.3.3. Do NOT use heat to bend bars.

2.3.4. Remove and replace reinforcement with following fabrication defects.

2.3.4.1. Bar lengths, depths and bends exceeding specified fabrication tolerances.

2.3.4.2. Bends or kinks not shown on Drawings or final shop drawings.

- 3.2.7. Interrupt reinforcement at control, contraction, and expansion joints or as indicated on drawings.
- 3.2.8. Place reinforcement to achieve slab and curb alignment as detailed.
- 3.2.9. Provide dowel joints at interruptions of concrete.

3.3. FIELD QUALITY CONTROL

- 3.3.1. Field inspection will be performed under provisions of Section 01 45 00 and 01 45 29.
- 3.3.2. Notify Architect 48 hours minimum prior to placement of concrete.

END OF SECTION

SECTION 03 30 10
CAST-IN-PLACE CONCRETE

1. PART 1 - GENERAL

1.1. SECTION INCLUDES, BUT NOT LIMITED TO:

1.1.1. All cast-in-place concrete.

1.1.2. Slabs on grade.

1.2. REFERENCES

1.2.1. International Building Code (IBC) 2006 edition, as adopted by Authority Having Jurisdiction, (AHJ).

1.2.2. ACI 117 - Standard Tolerances for Concrete Construction and Materials

1.2.3. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete

1.2.4. ACI 301 - Structural Concrete for Buildings

1.2.5. ACI 318 - Building Code Requirements for Reinforced Concrete

1.2.6. ASTM C 31 - Making and Curing Concrete Test Specimens in the Field

1.2.7. ASTM C 33 - Concrete Aggregates

1.2.8. ASTM C 39 - Compressive Strength of Cylindrical Concrete Specimens

1.2.9. ASTM C 94 - Ready-Mixed Concrete

1.2.10. ASTM C 143 -Slump of Hydraulic Cement Concrete

1.2.11. ASTM C 150 - Portland Cement

1.2.12. ASTM C 172 - Sampling Freshly Mixed Concrete by the Volumetric Method

1.2.13. ASTM C 192 - Making and Curing Concrete Test Specimens in the Laboratory

1.2.14. ASTM C 260 - Air-Entraining Admixtures for Concrete

1.2.15. ASTM C 494 - Chemical Admixtures for Concrete

1.2.16. ASTM C 618 - Fly Ash for Use as a Mineral Admixture in Portland Cement Concrete

1.3. SUBMITTALS

1.3.1. Submit under provisions of Section 01 33 00.

1.3.2. Product Data: Provide data on admixtures, finishing and curing compounds, including product characteristics, compatibility and limitations.

- 1.3.3.** Manufacturer's Installation Instructions: Submit criteria for preparation and application.
- 1.3.4.** Mix designs: Prepare mix designs for Architect's review. Include the following information in mix design data:
 - 1.3.4.1.** Design
 - 1.3.4.1.1.** Project name, address, site location, and location of mix design usage.
 - 1.3.4.1.2.** Contractor, Sub-Contractor, Supplier and Plant Location.
 - 1.3.4.1.3.** Mix Number.
 - 1.3.4.1.4.** Specified compressive strength, maximum aggregate size, slump, and placement method.
 - 1.3.4.1.5.** Application and location in structure.
 - 1.3.4.2.** Materials
 - 1.3.4.2.1.** Design Method.
 - 1.3.4.2.2.** Water-Cement Ratio.
 - 1.3.4.2.3.** Cement: Type, amount, and compliance with specified criteria statement.
 - 1.3.4.2.4.** Aggregates: Source(s), gradations (individual and combined).
 - 1.3.4.2.5.** Admixtures: Brand, classification, dosage, addition method.
 - 1.3.4.2.6.** Water source.
 - 1.3.4.2.7.** Test Results, Batch Quantities, Yield (calculations).
 - 1.3.4.3.** Special Considerations
 - 1.3.4.3.1.** Unit Weight.
 - 1.3.4.3.2.** Other considerations relative to placement, curing, finishing and testing.

1.4. QUALITY ASSURANCE

- 1.4.1.** Conform to IBC Section 1905, and other applicable sections of Chapter 19
- 1.4.2.** Acquire cement and aggregate from same source for all work.

1.5. PRODUCT HANDLING AND STORAGE

- 1.5.1.** Deliver, store, protect and handle products under provisions of Section 01 60 00.
- 1.5.2.** Deliver materials in manufacturer's packaging including application instructions.

1.6. COORDINATION

- 1.6.1.** Coordinate work under provisions of Section 01 31 13.
- 1.6.2.** Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

2. PART 2 - PRODUCTS

2.1. CONCRETE MATERIALS

- 2.1.1.** Cement: Conform to ACI 318, IBC Section 1903, and ASTM C 150; Type II, low alkali.
- 2.1.2.** Fly Ash: Conform to ASTM C 618. 15 percent maximum of total cementitious material allowed. Cement replacement 1.2 to 1.0 is required (1.2 lb. of fly ash must be added for each 1.0 lb. of portland cement removed). Every 1.2 lb. of fly ash will count for 1.0 lb. of cement when determining the minimum of cement per cubic yard.
- 2.1.3.** Fine and Coarse Aggregates: Conform to ASTM C 33, and the following:
 - 2.1.3.1.** Coarse Aggregate: Clean, hard, fine-grained, sound, crushed rock or washed gravel.
 - 2.1.3.2.** Fine Aggregate: Washed natural or manufactured sand, hard, strong, durable particles: not more than 1 percent deleterious materials.
- 2.1.4.** Water: Clean, potable, and not detrimental to concrete.
- 2.1.5.** Concrete slab-on-grade rock base: Clean, washed crushed rock base, 3/8 / 3/4 inch grading, quality complying with ASTM C 33.

2.2. CONCRETE ACCESSORY PRODUCTS

- 2.2.1.** Membrane Curing Compound and Sealers
 - 2.2.1.1.** Curing Compound – vertical surfaces: Atlas Quantum-Cure, or equal, zero VOC, NSF/ANSI Standard 61 certified (www.atlastechproducts.com) when tested in accordance with ASTM C-156, curing compound shall have maximum moisture evaporation of 0.65 kg/ sq M, water-based, clear with fugitive dye.
 - 2.2.1.2.** Sealer: Atlas Tech-1315 at locations designated S1, complying with ASTM C 1315, Type 1 Clear Class A and B.
- 2.2.2.** Vapor Retarder Membrane
 - 2.2.2.1.** Manufacturer: Stego Wrap, www.stegoindustries.com, or equal.
 - 2.2.2.2.** Type: polyolefin geo-membrane film.
 - 2.2.2.3.** Product Characteristics.
 - 2.2.2.3.1.** Thickness: Minimum 15 mils.
 - 2.2.2.3.2.** Perm Rating: Maximum 0.01 grains/square foot/hour per ASTM F 1249.

- 2.2.2.3.3. Water vapor Transmission Rate: Maximum 0.006 grains/square foot/hour per ASTM F 1249.
 - 2.2.2.3.4. Puncture resistance: Minimum puncture resistance of 2200 grams per ASTM D 1709.
 - 2.2.2.3.5. Tensile Strength: Minimum tensile strength of 50 pounds per ASTM D 882. Values shall be based on ASTM E 154 Resistance to Decay test portion.
 - 2.2.2.3.6. Low Temperature Brittleness: Pass per ASTM D 1790.
 - 2.2.2.4. Accessories.
 - 2.2.2.4.1. Provide all required seam tapes and mastics as supplied by manufacturer.
 - 2.2.2.5. Vapor Retarder Tape
 - 2.2.2.5.1. Water Vapor Transmission Rate: ASTM E 96, 0.3 perms or lower
 - 2.2.2.5.2. Minimum 8-mils thick
 - 2.2.2.5.3. Minimum 4 inches wide
 - 2.2.2.5.4. Manufactured from High Density Polyethylene
 - 2.2.2.5.5. Pressure Sensitive Adhesive
 - 2.2.2.6. Accessories.
 - 2.2.2.6.1. Provide all required seam tapes and mastics as supplied by manufacturer.
- 2.2.3. Non Shrink Grout
 - 2.2.3.1. Premixed compound consisting on non-metallic aggregate, cement, water reducing and plasticizing admixtures, capable of developing a minimum compressive strength of 8,000 psi at 28 days when tested in accordance with CRD-C-621 and ASTM C 1107.
- 2.2.4. Admixtures
 - 2.2.4.1. Concrete admixtures shall be a subject to prior approval by the Architect. Calcium Chloride or admixtures containing chloride shall not be used. Admixture(s) shall not adversely affect concrete strength or color of colored concrete, where occurs.
 - 2.2.4.2. Water Reducing
 - 2.2.4.2.1. ASTM C494 Type A .
 - 2.2.4.2.2. ASTM C494 Type D.
 - 2.2.4.3. Air Entraining: Conform to ASTM C 260

- 2.2.4.4. Mid-Range Water-Reducers: Master Builders "Polyheed" or equal.
- 2.2.5. Void Forming Insulation: Styrofoam or equal, High Load 60.
- 2.2.6. Bonding Agent
 - 2.2.6.1. Provide SikaDur 32 Hi-Mod bonding agent/adhesive conforming to manufacturers criteria.
- 2.3. JOINT FORMING MATERIALS
 - 2.3.1. Formed Construction Joints: Meadow Burke Keyed Kold or equal, galvanized steel, tongue and groove type.
 - 2.3.2. Isolation Joint at radiused conditions: W.R. Meadows or equal, Ceramar, 3/8 inch thick by full depth of slab.
 - 2.3.3. Isolation Joint at perimeter conditions: W.R. Meadows or equal, Sealtight Fiber, 3/8 inch thick by full depth of slab.
 - 2.3.4. Weakened plane/control joints: Provide Soff-Cut system or sawcutting at all slab areas. Use of cast-in-place concrete joints is not acceptable.
- 2.4. JOINT SEALANTS
 - 2.4.1. Provide sealants per Section 07 90 00.
- 2.5. CONCRETE MIX
 - 2.5.1. Prepare concrete mix design in accordance with Section 01 45 00 and IBC Section 1905.
 - 2.5.1.1. Provide concrete mixes as necessary to attain strengths and characteristics as noted on the drawings and in the specifications.
 - 2.5.2. Concrete Mix: Foundations, Stem walls and all other concrete U.N.O.
 - 2.5.2.1. Strength: 3000 psi 28 days.
 - 2.5.2.2. Maximum Aggregate Size: 1 inch.
 - 2.5.2.3. Cement Content: 480 #/cubic yard minimum.
 - 2.5.3. Concrete Mix: Slab on Grade
 - 2.5.3.1. Strength: 4000 psi at 28 days.
 - 2.5.3.2. Maximum Aggregate Size: 1 inch.
 - 2.5.3.3. Minimum Cement Content: 570 #/ cubic yard minimum
 - 2.5.4. Mix concrete in accordance with ASTM C 94 and IBC Section 1905.
- 2.6. SOURCE QUALITY CONTROL AND TESTING
 - 2.6.1. Provide for testing under the provisions of Section 01 45 29.

2.6.1.1. Cement: IBC Section 1903.

2.6.1.2. Aggregate: IBC Section 1903.

2.7. OTHER MATERILS

2.7.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. Verify all excavations have been inspected and approved by the Geotechnical Engineer. Verify all reinforcement and forms have been inspected and approved.

3.1.1.4. Verify concrete elevations, dimensions, and alignment with work specified in other sections.

3.1.1.5. Verify requirements for concrete cover over reinforcement.

3.1.1.6. Identify, verify, and coordinate placement of piping and conduit sleeves through concrete.

3.1.1.7. Identify, verify, and coordinate the location, dimension, and requirements of all depressions, recesses, block-outs and other provisions.

3.1.1.8. Verify anchors, seats, plates, reinforcement and other items embedded in concrete are accurately placed, positioned securely, and will permit proper concrete placement.

3.1.2. Discrepancies

3.1.2.1. In the event of discrepancy, immediately notify the Architect.

3.1.2.2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

3.2.1. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions. Before concrete is deposited upon or against concrete that has taken its initial set or has hardened, mechanically roughen hardened concrete to minimum 1/4 inch amplitude. Remove all encrustations from forms and reinforcements

3.2.2. Vapor retarder/barrier membrane installation

- 3.2.2.1.** Install in accordance with manufacturer's instructions and ASTM E 1643-98.
- 3.2.2.2.** Proof roll subgrade.
- 3.2.2.3.** Place 4 inch crushed rock base over sub-grade.
- 3.2.2.4.** Place vapor retarder/barrier membrane over rock base, lapping edges 12 inches. Tape and seal edges and penetrations. Extend membrane to footing face and turn down to bottom of footing.
- 3.2.2.5.** Provide pipe "boots" at all pipe and conduit penetrations in accordance with manufacturer's recommendations.
- 3.2.2.6.** Obtain inspectors approval of membrane installation before placing concrete.
- 3.2.2.7.** Exercise care in placing reinforcing steel and concrete to avoid puncturing vapor retarder/barrier membrane. Do not drive stakes through the membrane. Use flat base screed supports.
- 3.2.2.8.** Repair vapor retarder/barrier damaged during placement of concrete reinforcing. Repair with same material; lap over damaged areas minimum 6 inches and seal watertight with manufacturers approved seam tape.
- 3.2.2.9.** No penetration of the vapor retarder is allowed except for reinforcing steel and permanent utilities

3.3. PLACING CONCRETE

- 3.3.1.** Place concrete in accordance with ACI 304 and IBC Section 1905.
- 3.3.2.** Ready mix concrete shall be delivered in accordance with ASTM C 94. Concrete shall be placed within 90 minutes after batching. Concrete temperature exceeding 90 degrees Fahrenheit prior to placement will not be accepted.
- 3.3.3.** Conform to ACI 305R when concreting during hot weather or when weather conditions may cause rapid evaporation of moisture. Conform to ACI 306R for concrete placement in cold weather conditions.
- 3.3.4.** Ensure reinforcement, inserts, embedded parts, formed joint fillers, and joint devices are not disturbed during concrete placement.
- 3.3.5.** Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- 3.3.6.** Place concrete continuously between predetermined expansion, control, and construction joints.
 - 3.3.6.1.** Place construction joints only at locations shown on drawings or as approved by Architect.
- 3.3.7.** Conveying and Placing.
 - 3.3.7.1.** Convey concrete from the mixer to the place of final deposit by methods which will prevent the separation or loss of materials.

- 3.3.7.2.** To maximum extent possible, deposit concrete in its final position to avoid segregation due to rehandling or flowing. Deposit no concrete that has partially hardened or been contaminated by foreign materials. Do not use retempered concrete or concrete which has been remixed after initial set
- 3.3.7.3.** In depositing concrete in walls or thin sections of considerable height, use form openings, elephant trunks, tremies or other approved devices to permit the concrete placement in a manner to prevent segregation and accumulation of hardened concrete on the forms or metal reinforcements above the level of the concrete. Place devices so that the concrete will be dropped vertically. Do not exceed an unconfined vertical drop greater than 5 feet measured from the end of such devices to the placement surface. Deposit in approximately horizontal layers, maximum 24 inches in thickness.
- 3.3.7.4.** Once concrete placement begins, maintain a continuous operation until the placing of the panel or section is completed. Maintain level top surfaces of vertically formed lifts.
- 3.3.7.5.** Thoroughly consolidate concrete during placement. Work around reinforcement and embedded fixtures using mechanical vibrators. Transmit vibration directly to concrete and in no case through forms. Do not allow vibrators to contact forms or reinforcing.

3.3.8. Pumped Concrete.

- 3.3.8.1.** Do not use aluminum or aluminum lined pipe. Prevent concrete from contacting aluminum fittings.
- 3.3.8.2.** Provide minimum 3 inch hose diameter for 1 inch aggregate concrete. Provide minimum 4 inch hose diameter for 1-1/2 inch aggregate concrete.
- 3.3.8.3.** Use only piston type reversible pumps. Provide standby pump of same capacity available onsite within one hours notice.
- 3.3.8.4.** Do not add water to the mix after batching at the plant.
- 3.3.8.5.** Thoroughly consolidate concrete during placement. Work around reinforcement and embedded fixtures using mechanical vibrators. Transmit vibration directly to concrete and in no case through forms. Do not allow vibrators to contact forms or reinforcing.

3.4. CONCRETE FINISHING

3.4.1. Slab Finish

- 3.4.1.1.** General Finishing Criteria: Unless otherwise specified, comply with the following criteria:
 - 3.4.1.1.1.** When concrete has hardened sufficiently, float to a compact and smooth surface.
 - 3.4.1.1.2.** After floating, wait until concrete has reached the proper consistency before troweling.
 - 3.4.1.1.3.** Trowel slab surface with not less than two troweling operations with steel hand trowel.

- 3.4.1.1.4. Final troweling shall produce hard, impervious, and nonslip surfaces, free from defects and blemishes.
 - 3.4.1.1.5. Sprinkling a mixture of dry cement or cement mixture on concrete slab to absorb surface moisture will not be permitted.
- 3.4.2. Unless otherwise specified in paragraph 3.4.3, comply with the following criteria:
 - 3.4.2.1. Unless specified otherwise, provide smooth steel trowel finish at all slabs per ACI 302.1R, Class 3, free of ridges and defects. Steel troweling shall consist of three separate operations.
 - 3.4.2.2. Obtain Architect's approval of finish prior to proceeding.
 - 3.4.2.3. At all corridors, utility areas, and similar surfaces not receiving subsequent finish, provide medium swirl texture.
 - 3.4.2.4. Slabs receiving clear or colored sealer: Provide steel trowel and medium broom finish. Broom finish shall be placed in a pattern as directed by the Architect.
 - 3.4.2.5. Slabs receiving mortar beds, ceramic tile, waterproofing membranes or seamless flooring: Provide steel trowel and very light broom finish.
- 3.4.3. Slabs on Grade:
 - 3.4.3.1. Place concrete using vibratory laser screeds, highway straight edges and large diameter power troweling.
 - 3.4.3.2. Re-straighten slab surface as required.
 - 3.4.3.3. Provide hand troweled finishing, using 36-48 inch long straight edge, at slab joints.
- 3.4.4. Wall/footing face Finish
 - 3.4.4.1. Type 1 - Paint/coating finished or unfinished concrete:
 - 3.4.4.1.1. Produce surface without honeycomb, air pockets or "bug-holes".
 - 3.4.4.1.2. Utilize high density form with joints butt taped or with non absorbent sealant.
 - 3.4.4.1.3. Plug tie holes, fill and grind smooth.
 - 3.4.4.1.4. Surface shall present a consistent and even surface for application of coating. Prepare surface in accordance with paint coating manufacturer's requirements and this Section.
- 3.4.5. Exterior Slab Floors at service areas:
 - 3.4.5.1. Exterior Service/Utility Concrete Slabs: Provide steel trowel and medium broom finish. Broom finish shall be placed in a pattern as directed by the Architect.

3.4.6. Surface Defects

- 3.4.6.1.** Surface defects shall be as defined in ACI 309.2R.
- 3.4.6.2.** Surface irregularities shall be as defined in ACI 347 for Class B surfaces for semi exposed surfaces, and Class A surfaces at all exposed to view conditions.
- 3.4.6.3.** All surface defects shall be repaired per approved methods and as specified.
- 3.4.6.4.** All void defects, such as honeycombing, air holes, and form streaking, shall be repaired by removing all defective material to sound surfaces. Patch void created with approved portland cement based, polymer modified mortar. Match color and texture of adjacent surfaces.
- 3.4.6.5.** All fins, grout lines, ridges and other form leakage defects shall be ground smooth per Architect's direction.
- 3.4.6.6.** All concrete surfaces exceeding tolerances specified shall be brought within tolerance by grinding or filling.
- 3.4.6.7.** Where, in the Architect's opinion, it is necessary to maintain satisfactory appearance, the entire surface of any one component or element shall be repaired by the "sack and patch" method or other approved method.

3.5. EXPANSION AND WEAKENED PLANE JOINT INSTALLATION

- 3.5.1.** Locate and form expansion control and contraction joints. Coordinate location with joint pattern shown for finish flooring.
- 3.5.2.** Place formed construction joints in floor slab. Set top screed to required elevations. Secure to resist movement of wet concrete.
- 3.5.3.** Install isolation joints between slab edges and vertical structural elements.
- 3.5.4.** Install sealants in accordance with Section 07 90 00.
- 3.5.5.** Provide Soff-cut or equal weakened plane joints at locations shown on drawings
 - 3.5.5.1.** Saw cut slab before random shrinkage cracks form, and as soon as slab is firm enough to not be damaged by saw blade. Complete saw cutting within 12 hours of pour.

3.6. CURING AND PROTECTION

- 3.6.1.** Cure all floor slabs and all formed surfaces in accordance with ACI 308.
- 3.6.2.** Inclement Weather Curing:
 - 3.6.2.1.** Hot Weather Curing: Conform with ACI 305, Chapter 4. In any case, concrete shall not be placed when the ambient temperature exceeds 90 degrees F.
 - 3.6.2.2.** Cold Weather Curing: Conform with ACI 306R.
- 3.6.3.** Floor Surface Curing

- 3.6.3.1.** Cure floor surfaces in accordance with ACI 308.
- 3.6.3.2.** Membrane Curing Compound: Apply curing compound in accordance with manufacturer's instructions and as specified.
 - 3.6.3.2.1.** Concrete Cure and Sealer: Apply in accordance with manufacturer's instructions. In addition to locations shown on drawings, apply at exterior seating areas.
 - 3.6.3.2.2.** Do not use curing compounds on surfaces finished with paint, tile, and similar finishes unless it can be demonstrated, to the Architect's approval, that the membrane can be satisfactorily removed before the subsequent application is made, or that the membrane can serve as a base for the later application.
 - 3.6.3.2.3.** Apply membrane curing compound after finishing concrete and as soon as free water on the surface has disappeared and no water sheen is visible, but not so late that the curing compound is absorbed into the concrete.
 - 3.6.3.2.4.** Provide minimum of two coats, with the second coat at right angles to the first.

3.6.4. Vertical and Other Formed Surface:

- 3.6.4.1.** After the concrete has hardened and while the forms are still in place, form ties may be loosened and water applied to run down on the inside of the form if necessary to keep the concrete wet.
- 3.6.4.2.** When forms are removed, the exposed concrete surfaces shall be wet with water immediately and kept moist until curing compound is applied.
- 3.6.4.3.** Just prior to application of curing compound, the concrete shall be allowed to reach a uniformly damp appearance with no free water on the surface and then the application of curing compound should be begun at once.
- 3.6.4.4.** Apply approved membrane curing compound in accordance with manufacturer's instructions. Provide minimum of two coats, with the second coat at right angles to the first.

3.7. FIELD QUALITY CONTROL

- 3.7.1.** Perform work of this section under the supervision of a capable concrete superintendent.
- 3.7.2.** Provide free access to Work and cooperate with appointed testing and inspection firm.
- 3.7.3.** Continuously monitor concrete placing operations to maintain level floors by use of an instruments transit or level.
- 3.7.4.** Placing Record: A record shall be kept on the site of the time and date of placing the concrete in each portion of the structure. Such record shall be kept until the completion of the structure and shall be open to the inspection of the Building Department and the Architect.

- 3.7.5.** Field special inspection and testing , paid for by the owner per IBC Section 1704 will be performed in accordance under provisions of Sections 01 45 00 and 01 45 29.
- 3.7.5.1.** Inspector will reject concrete not conforming to this Section, including concrete which is not placed within 90 minutes after batching.
- 3.7.5.2.** Provide full time special inspection per IBC Section 1704 during the taking of test specimens and during the placing of all concrete and embedded steel.
- 3.7.6.** Concrete shall not be placed until the forms and reinforcement have been inspected, all preparations for the placement have been completed, and the preparations have been checked by a special inspector approved by jurisdictional authority.
- 3.7.7.** Molded Cylinder Tests: Shall be obtained from the point where the concrete is placed into the forms or final point of placement in accordance with ASTM C 172 and in accordance with the following:
- 3.7.7.1.** Four identical cylinders shall be taken from each days pour greater than 5 yards and a set from each pour of 50 cubic yards or more, being placed each day per IBC Section 1905.
- 3.7.7.2.** Test one cylinder at age 7 days. Test two cylinders at age 28 days unless otherwise specified. Testing lab shall preserve remaining cylinder for future use.
- 3.7.7.3.** Each cylinder shall be dated, given a number, the point in the structure from which the sample was taken, the mix design number, mix design strength, and the result of the accompanying slump test noted.
- 3.7.7.4.** Test cylinders shall be made at the job and stored by the Testing Laboratory in accordance with ASTM C 31, and tested in accordance with ASTM C 39 and IBC Section 1905.
- 3.7.8.** One slump test will be taken for each set of test cylinders taken in accordance with ASTM C 143.
- 3.8. TOLERANCES**
- 3.8.1.** All tolerances shall be as defined in ACI 117 and as specified.
- 3.8.2.** Classification shall be per General Building: Cast-in-Place, ACI 117, Section 4.0, unless noted otherwise.
- 3.8.3.** Unless noted otherwise, depressions in slab floors between high spots shall be a maximum 3/16 inch in ten feet, using a metal straight edge placed at any location on slab.
- 3.8.4.** Slab Floor Tolerance Defects:
- 3.8.4.1.** Repair all slab areas not complying with specified floor values by grinding or filling as required to achieve compliance.
- 3.8.5.** Tolerance for deviation from designated form line at bleacher seating slabs shall be a maximum of 1/4 inch in any ten feet, non-cumulative.

3.9. PATCHING

- 3.9.1.** Exposed formed concrete surfaces, both interior and exterior, including surfaces designated to receive painted finish, shall provide surfaces suitable for subsequent finishing, free from imperfect joints, fins, "honeycombing", air pockets or "bug" holes, or other such imperfections.
- 3.9.2.** Remove rough spots, stains and hardened mortar or grout from intended smooth surfaces by rubbing such surfaces lightly with fine Carborundum stone. Use liberal amount of water and rub sufficiently to remove defects without changing texture of concrete.
- 3.9.3.** If surfaces designated as smooth are not uniform in texture and finish, treat as follows:
 - 3.9.3.1.** Prepare patching mix and apply to test location as directed by Architect.
 - 3.9.3.2.** Obtain Architects approval of finish, color and texture of patching mix.
 - 3.9.3.3.** Repair remaining defects with approved mixture.
 - 3.9.3.4.** Texture surface to match approved finish..
 - 3.9.3.5.** Complete entire operation for any area the day it is started.
 - 3.9.3.6.** Do not use dry cement sacking.
- 3.9.4.** Filling Snap Tie Cone Holes:
 - 3.9.4.1.** Break off tie rods at bottom of cone holes.
 - 3.9.4.2.** Concealed Applications: Flush hole with water, and allow to dry. Coat entire inner surface of cone hole with liquid bonding agent, then grout holes solid with approved cement grout and grind smooth.
 - 3.9.4.2.1.** Finish patches as specified above in Article 3.9.3.
 - 3.9.4.3.** Exposed Applications: Flush hole with water, and allow to dry. Coat entire inner surface of cone hole with liquid bonding agent. Insert semi-recessed plug with approved cement.
- 3.9.5.** Filling Taper Tie Holes:
 - 3.9.5.1.** Flush hole with water, and allow to dry. Grout holes solid with approved cement grout and grind smooth.
 - 3.9.5.2.** Finish patches as specified in paragraph 3.9.3.
- 3.9.6.** Finishing Supertie system:
 - 3.9.6.1.** Break off Supertie rod and finish per manufacturers instructions.

3.10. DEFECTIVE CONCRETE

- 3.10.1.** Concrete will be considered defective if strength characteristics indicated by tests of molded cylinders and core tests fall below the minimum 28-day strengths specified or indicated. Replace or adequately strengthen such defective concrete in a manner acceptable to the Architect and Structural Engineer.

- 3.10.2.** Concrete will be considered defective if any one of the following conditions occurs:
- 3.10.2.1.** Any concrete work not formed as indicated or is not in conformance with specified tolerances.
 - 3.10.2.2.** Any concrete with voids or honeycomb that has been cut, resurfaced or filled, unless under the direction of the Structural Engineer.
 - 3.10.2.3.** Any concrete with sawdust, shavings, wood, or embedded debris.
 - 3.10.2.4.** Any concrete placed more than 90 minutes after batching.
 - 3.10.2.5.** Replace or repair such defective concrete to the satisfaction of the Architect at no extra cost to the Owner.

3.11. EQUIPMENT BASES

- 3.11.1.** Provide concrete bases and anchorage for mechanical, electrical, and other work as required and shown on the drawings and in accordance with reviewed Shop Drawings of related trades.

3.12. MISCELLANEOUS CONCRETE WORK

- 3.12.1.** Provide areaways, cast-in-place valve boxes, pits, splash blocks, bases, and other miscellaneous concrete as shown and required to complete the Work. Conform to applicable requirements as specified in this section.

3.13. ADJUST AND CLEAN

- 3.13.1.** Protect exposed concrete finish such as bases, curbs, and similar work as necessary to prevent damage resulting from impact or from subsequent work or rubbish.
- 3.13.2.** Protect work of other Sections from damage by Work of this Section with heavy craft paper.
 - 3.13.2.1.** Maintain protection in effective condition for as long as the need for protection exists.
 - 3.13.2.2.** Control use of water within the building so that no damage to previously installed work or existing structure and finish is permitted to occur.

END OF SECTION

SECTION 04 05 13
MASONRY MORTAR AND GROUTING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Mortar and grout for masonry.

1.2. RELATED WORK

1.2.1. Section 01 45 29 - Testing Laboratory Services.

1.2.2. Section 04 22 00 - Reinforced Unit Masonry System.

1.3. REFERENCES

1.3.1. International Building Code (IBC) 2006 edition, as adopted by Authority Having Jurisdiction (AHJ).

1.3.2. ASTM C94- Ready-Mixed Concrete

1.3.3. ASTM C144 - Aggregate for Masonry Mortar.

1.3.4. ASTM C150 - Portland Cement.

1.3.5. ASTM C207 - Hydrated Lime for Masonry Purposes.

1.3.6. ASTM C270 - Mortar for Unit Masonry.

1.3.7. ASTM C404 - Aggregates for Masonry Grout.

1.3.8. ASTM C476 - Grout for Masonry.

1.3.9. ASTM C 780 – Pre-construction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.

1.3.10. ASTM C1019 - Sampling and Testing Grout.

1.3.11. ASTM C1586 - Standard Guide for Quality Assurance of Mortars.

1.4. DELIVERY, STORAGE, AND HANDLING

1.4.1. Deliver products to site under provisions of Section 01 60 00.

1.4.2. Store and protect products under provisions of Section 01 60 00.

1.4.3. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.5. SUBMITTALS

1.5.1. Submit under provisions of Section 01 33 00.

1.5.2. Product Data: Provide data on admixtures, including product characteristics, compatibility and limitations.

1.5.3. Mix designs: Include the following information in grout and mix design data:

1.5.3.1. Design

1.5.3.1.1. Project name, address, site location, and location of mix design usage.

1.5.3.1.2. Contractor, Sub-Contractor, Supplier and Plant Location.

1.5.3.1.3. Mix Identification Number.

1.5.3.1.4. Specified compressive strength, maximum aggregate size, slump, and placement method.

1.5.3.1.5. Application and location in structure.

1.5.3.2. Materials

1.5.3.2.1. Design Method.

1.5.3.2.2. Slump.

1.5.3.2.3. Cement: Type, amount, and compliance with specified criteria statement.

1.5.3.2.4. Aggregates: Source(s), gradations (individual and combined).

1.5.3.2.5. Water source.

1.5.3.3. Test Results, Batch Quantities, Yield (calculations).

1.6. ENVIRONMENTAL REQUIREMENTS

1.6.1. Maintain materials and surrounding air temperatures to minimum 50 degrees F prior to, during, and 48 hours after completion of masonry work.

2. PART 2 - PRODUCTS

2.1. MATERIALS

2.1.1. Mortar Aggregate: ASTM C144 with not less than 3 percent passing #100 sieve.

2.1.2. Grout Aggregate: ASTM C404.

2.1.2.1. Coarse Aggregate: 100 percent passing 3/8 inch sieve and not more than 5 percent passing #8 sieve.

2.1.2.2. Fine Aggregate: Washed, natural sand; not more than 2 percent by weight deleterious substances; 5 percent minimum passing # 100 sieve.

2.1.3. Portland Cement: ASTM C150 Type I or II, free alkali content 0.06 percent maximum, gray color.

- 2.1.4.** Hydrated Lime: ASTM C207, Type S.
- 2.1.5.** Water: Clean and potable.
- 2.1.6.** Admixtures:
 - 2.1.6.1.** Grout: Not allowed.
 - 2.1.6.2.** Mortar: No admixtures permitted, except colorant.
- 2.1.7.** Mortar Colorant: Approved for use in mix, 100 percent mineral oxide, two separate colors as selected by Architect from standard color range. Provide mortar colorant at applications where masonry is exposed to view in final construction.

2.2. MORTAR MIXES

- 2.2.1.** Mortar for Reinforced Masonry: ASTM C270 Proportion mix.
 - 2.2.1.1.** Provide Type S as indicated on Structural Drawings, minimum compressive strength as indicated on the drawings.
- 2.2.2.** Proportions - Type S:
 - 2.2.2.1.** 1 Part Portland Cement.
 - 2.2.2.2.** Not less than 1/4 part nor more than 1/2 part lime.
 - 2.2.2.3.** Mortar Aggregate: Not less than 2-1/4 and not more than 3 times the sum of the separate volumes of cementitious materials.

2.3. MORTAR MIXING

- 2.3.1.** Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C270.
 - 2.3.1.1.** Use mixer with capacity for batches using full sack volumes of cement.
 - 2.3.1.2.** Charge the mixer in the following sequence:
 - 2.3.1.2.1.** 1/2 quantity of sand, water, and admixture and colorant.
 - 2.3.1.2.2.** Full quantity of cement; Partial sack batches are prohibited.
 - 2.3.1.2.3.** 1/2 quantity of sand, water, and admixture and colorant.
 - 2.3.1.2.4.** Full quantity of lime.
 - 2.3.1.2.5.** Additional water as required for workable mix.
- 2.3.2.** If water is lost by evaporation, retemper only within one hour of mixing or prior to cement reaching initial set, which ever occurs first.

2.4. GROUT MIXES

- 2.4.1.** Grout: Comply with ASTM C476 proportion by volume only and as specified on the structural drawings.

2.4.1.1. Type: Coarse or Fine grout for concrete masonry units.

2.4.1.2. Slump: 8-11 inches slump at all grouting applications.

2.4.2. Coarse grout proportions (based on loose volume):

2.4.2.1. 1 Part Portland Cement.

2.4.2.2. Fine Aggregate: 2-1/4 to 3 times the sum of the volumes of the cementitious materials.

2.4.2.3. Coarse Aggregate: 1 to 2 times the sum of the volumes of the cementitious materials.

2.4.2.4. 0 to 1/10 part hydrated lime or lime putty.

2.4.2.5. Grout admixture: Not allowed.

2.4.2.6. Fly Ash: Not allowed.

2.5. GROUT MIXING

2.5.1. Mix grout concrete in accordance with ASTM C94, and IBC Section 2103.12

2.5.2. Do not use anti-freeze compounds to lower the freezing point of grout.

2.6. OTHER MATERIALS

2.6.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

2.7. SOURCE QUALITY CONTROL

2.7.1. Provide for testing under the provisions of Section 01 45 29.

2.7.2. Cement: ASTM C150.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

3.2.1. Install mortar and grout to requirements of the specific masonry Sections.

3.3. FIELD QUALITY CONTROL

3.3.1. Test mortar and grout in accordance with Section 01 45 29, including IBC Section 2105.

3.3.2. Testing of Mortar Mixes:

3.3.2.1. Mortar Test: For each type of mortar, provide mortar tests per ASTM C 780.

3.3.2.2. For the first three days of masonry work, prepare three test specimens for each masonry crew.

3.3.2.3. Following the first three days of grouting, prepare one masonry sample per week for each masonry crew. Prepare additional specimens when changes in job conditions or materials occur.

3.3.3. Testing of Grout Mixes:

3.3.3.1. Grout Test: For each grout strength, provide grout sample field tests per ASTM C 1019.

3.3.3.2. For the first three days of grouting, prepare three test specimens for each masonry crew.

3.3.3.3. Following the first three days of grouting, prepare one masonry sample per week for each masonry crew. Prepare additional specimens when changes in job conditions or materials occur.

END OF SECTION

SECTION 04 22 00
CONCRETE UNIT MASONRY

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Masonry units.
- 1.1.2.** Reinforcement, anchorage, and accessories.

1.2. PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

- 1.2.1.** Section 05500 - Metal Fabrications: Placement of fabricated metal items built into masonry.

1.3. REFERENCES

- 1.3.1.** International Building Code (IBC) 2006 edition, as adopted by Authority Having Jurisdiction (AHJ).
- 1.3.2.** ACI 315 - Details and Detailing of Concrete Reinforcement.
- 1.3.3.** ASTM A615- Deformed and Plain Carbon Steel Bars for Concrete Reinforcement.
- 1.3.4.** ASTM A706 - Low Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
- 1.3.5.** ASTM C90 – Load bearing Concrete Masonry Units.
- 1.3.6.** ASTM C1314 - Compressive Strength of Masonry Prisms.
- 1.3.7.** ASTM C90 - Hollow Load Bearing Concrete Masonry Units.
- 1.3.8.** ASTM C 55 - Standard Specification for Concrete Brick.

1.4. QUALIFICATIONS

- 1.4.1.** Installer: Company specializing in performing the work of this Section with minimum 5 years documented experience.

1.5. SUBMITTALS

- 1.5.1.** Submit under provisions of Section 01 33 00.
- 1.5.2.** Samples:
 - 1.5.2.1.** Submit two full size 6-inch square samples of each block type and color indicating surface texture and color.
- 1.5.3.** Certification: Submit certification from block manufacturer confirming compliance with criteria established by referenced standard and this section.
- 1.5.4.** Materials List: Submit proposed materials list for all products used.

1.5.5. Shop Drawings

- 1.5.5.1.** Submit steel reinforcement shop drawings in accordance with ACI 315. Include placing drawings and bending charts. Show length and locations of splices, size and length of reinforcing steel, bar position dimensions and spacing. Placing drawings must include 1/4" scale elevations of all walls with openings and penetrations shown.

1.5.6. Mock-up

- 1.5.6.1.** Prior to beginning installation, prepare in-place mock-up of approximately 4 foot by 6 foot high, and obtain Architect's approval.

1.6. DELIVERY, STORAGE, AND HANDLING

- 1.6.1.** Deliver products to site under provisions of Section 01 60 00.

1.7. SEQUENCING AND SCHEDULING

- 1.7.1.** Coordinate work under provisions of Section 01 31 13.

1.8. GUARANTEE

- 1.8.1.** Provide the Owner with a guarantee, in Architect approved form, against the following specific defects or failures for a period of three (3) years after Notice of Substantial Completion:

- 1.8.1.1.** Expansion/contraction cracks.

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. CONCRETE MASONRY UNITS: SMOOTH FACE

2.2.1. Type:

- 2.2.1.1.** Block: Hollow Load Bearing Block Units per ASTM C90 and Section 2103.1.

- 2.2.1.1.1.** Minimum compressive strength of 1900 psi as a component of design f'm assembly value of 1500 psi.

2.2.2. Weight Classification All units: Normal Weight

2.2.3. Size and style

- 2.2.3.1.** Block: Nominal 8 x 8 x 16 and 8 x 12 x 16, hollow load bearing units, one open end at vertical reinforcing, bond beam units at horizontal reinforcing. Provide additional sizes as required and as shown on drawings.

- 2.2.3.2.** Provide closed end units at all outside corners and ends.

- 2.2.3.3. Provide cap block and sill block profiles as shown on drawings.
 - 2.2.3.4. Provide U-lintel solid bottom units at exposed lintel conditions.
 - 2.2.4. Color: Match Existing
- 2.3. CONCRETE MASONRY UNITS: SPLIT FACE
 - 2.3.1. Type:
 - 2.3.1.1. Block: Hollow Load Bearing Block Units ASTM C 90
 - 2.3.1.1.1. Minimum compressive strength of 1900 psi as a component of design f'm assembly value of 1500 psi.
 - 2.3.2. Weight Classification:
 - 2.3.2.1. All units: Normal Weight
 - 2.3.3. Size and style
 - 2.3.3.1. Block: Nominal 8 x 8 x 16 and 12 x 8 x 16, 8 x 4 x 16 and 12 x 4 x 16, hollow load bearing units, one open end at vertical reinforcing, bond beam units at horizontal reinforcing.
 - 2.3.3.2. Provide closed end units at all outside corners and ends.
 - 2.3.3.3. Provide cap block and sill block profiles as shown on drawings.
 - 2.3.3.4. Provide U-lintel solid bottom units at exposed lintel conditions.
 - 2.3.3.5. Provide U-lintel solid bottom units at exposed lintel conditions.
 - 2.3.4. Finish
 - 2.3.4.1. Provide split face finish as produced by Young Block at exposed exterior surfaces as shown on drawings.
 - 2.3.4.2. Where outside corners, ends, and free-standing walls are provided, provide split face finish at all surfaces visible in completed construction.
 - 2.3.4.3. Unless noted otherwise, provide precision block finish at all interior surfaces.
 - 2.3.5. Color: Match Existing.
 - 2.3.5.1. Exposed Exterior Applications at Buildings: Provide specified Young Block split face block colors. Color match is critical. Architect will be sole judge of color match when considering acceptability of proposed substitutions.
- 2.4. ACCESSORIES, REINFORCEMENT AND ANCHORAGE
 - 2.4.1. Reinforcing Steel: ASTM A 615 or ASTM A 706, in accordance with Section 2103.13.
 - 2.4.2. Where required or shown on structural drawings, provide prefabricated horizontal joint reinforcement complying with Section 2103.13, hot dipped galvanized.

2.4.3. Mortar and Grout: Per Section 04 05 13.

2.5. SOURCE QUALITY CONTROL AND TESTING

2.5.1. Provide for testing under the provisions of Section 01 45 29.

2.5.1.1. Masonry Units: IBC Section 2105.

2.6. OTHER MATERIALS

2.6.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.1.1.4. In the event of discrepancy, immediately notify the Architect.

3.1.1.5. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

3.2.1. Direct and coordinate placement of metal anchors supplied to other Sections.

3.2.2. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.3. COURSING

3.3.1. Establish lines, levels, and coursing indicated. Protect from displacement.

3.3.2. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

3.3.3. Lay masonry units in running bond.

3.3.4. Joint Tooling:

3.3.4.1. Tool exterior wall joints concave.

3.3.4.2. Tool exposed interior wall joints concave.

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3.6. GROUTING

- 3.6.1.** Provide coarse grout.
- 3.6.2.** Grout masonry using specified grouting techniques.
- 3.6.3.** When grouting is stopped for more than one hour, terminate grout 1/2 inch below top of upper masonry unit to form a positive key for subsequent grout placement.
- 3.6.4.** Low Lift Grouting
 - 3.6.4.1.** Conform to requirements of IBC Section 2104.6.
 - 3.6.4.2.** Install masonry units to a maximum height of 60 inches.
 - 3.6.4.3.** Remove all overhanging mortar and mortar droppings.
 - 3.6.4.4.** Place grout and mechanically vibrate and re-vibrate for grout consolidation.

3.7. BUILT - IN WORK

- 3.7.1.** As work progresses, build in anchor bolts, plates, and other items furnished by other Sections.
- 3.7.2.** Build in items plumb and level.

3.8. TOLERANCES

- 3.8.1.** Maximum Variation from Unit to Adjacent Unit: 1/16 inch.
- 3.8.2.** Maximum Variation From Plane of Wall: 1/4 inch in 10 feet and 1/2 inch in 20 feet or more.
- 3.8.3.** Maximum Variation From Plumb: 1/4 inch per story non-cumulative.
- 3.8.4.** Maximum Variation From Level Coursing: 1/8 inch in 3 feet and 1/4 inch in 10 feet; 1/2 inch in 30 feet.
- 3.8.5.** Maximum Variation of Joint Thickness: 1/8 inch in 3 feet.

3.9. CUTTING AND FITTING

- 3.9.1.** Cut and fit for chases, pipes, conduit, sleeves, grounds, and other penetrations. Coordinate with other Sections of work to provide correct size, shape, and location.
- 3.9.2.** Obtain Architect approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.10. CLEANING

- 3.10.1.** Clean work under provisions of Section 01 77 19.
- 3.10.2.** Remove excess mortar and mortar smears.
- 3.10.3.** Replace defective mortar. Match adjacent work.
- 3.10.4.** Use non-metallic tools in cleaning operations.

3.10.5. Do not use acid or acid base cleaning agents.

3.11. PROTECTION OF FINISHED WORK

3.11.1. Protect finish installation under provisions of Section 01 50 00.

3.11.2. Without damaging completed work, provide protective boards at exposed external corners which may be damaged by construction activities.

3.12. FIELD QUALITY ASSURANCE

3.12.1. Perform testing and inspection under the provisions of Section 01 45 00.

3.12.2. Masonry Inspection: Provide inspection per Sections 1705.3

3.12.3. Masonry Testing: Provide testing per Section 2105.

END OF SECTION

SECTION 05 12 00
STRUCTURAL STEEL FRAMING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Structural steel framing and support members.
- 1.1.1.** Baseplates.
- 1.1.2.** Grouting under baseplates.

1.2. REFERENCES

- 1.2.1.** International Building Code (IBC), 2006 edition, as adopted by Authority Having Jurisdiction (AHJ).
- 1.2.2.** ASTM A 6 - General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use.
- 1.2.3.** ASTM A 36 - Structural Steel.
- 1.2.4.** ASTM A 53 – Pipe, Steel, Black and Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.
- 1.2.5.** ASTM A 123 - Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.
- 1.2.6.** ASTM A 307 - Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- 1.2.7.** ASTM A 325 - Structural Bolts, Steel, Heat Treated, 120/150 ksi Minimum Tensile Strength.
- 1.2.8.** ASTM A 440 – Structural Bolts, Alloy Steel, Heat Treated, 150 KSI minimum Tensile Strength.
- 1.2.9.** ASTM A 500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
- 1.2.10.** ASTM A 563 – Carbon and Alloy Steel Nuts.
- 1.2.11.** ASTM A 992 – Structural Steel Shapes.
- 1.2.12.** ASTM F 1554 – Anchor Bolts, Steel, 36, 55, and 105 ksi Strength
- 1.2.13.** AWS A2.4 - Standard Symbols for Welding, Brazing, and Non-Destructive Examination.
- 1.2.14.** AWS D1.1 - Structural Welding Code - Steel.
- 1.2.15.** AWS D1.3 - Structural Welding Code - Sheet Steel.
- 1.2.16.** AWS D1.4 - Structural Welding Code - Reinforcing Steel.
- 1.2.17.** AWS QC-1 – Standard for AWS Certification of Welding Inspectors

- 1.2.18.** SSPC-Steel Structures Painting Council. – Painting Manual, Volumes 1 and 2
- 1.2.19.** AISC 360 - Specification for Structural Steel Buildings .
- 1.2.20.** AISC 341 – Seismic Provisions for Structural Steel Buildings.
- 1.2.21.** AISC - Code of Standard Practice for Steel Buildings and Bridges and Commentary, modified as follows:
 - 1.2.21.1.** Notwithstanding comments in the referenced standard and Commentary to the contrary, the Contractor shall be responsible for reviewing all contract documents, including but not limited to, the structural steel drawings, as required to ascertain all structural steel requirements, including dimensions, slopes and connections.
 - 1.2.21.2.** Delete paragraph 3.3 as written. Replace with: “Comply with procedures established by the General Conditions.”
 - 1.2.21.3.** In paragraph 4.4, delete “within 14 calendar days”. Replace with: “Comply with procedures established by the General Conditions and Section 01 33 00.”
- 1.2.22.** AISC – Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts.

1.3. SUBMITTALS

- 1.3.1.** Submit under provisions of Section 01 33 00.
- 1.3.2.** Shop Drawings:
 - 1.3.2.1.** Shop drawings shall include complete details and procedures and diagrams. Include details of cuts, connections, camber, holes, and other pertinent data.
 - 1.3.2.2.** Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorage to be installed as work of other sections.
 - 1.3.2.3.** Indicate welds by standard AWS A2.4 symbols, and show size, length, sequence, and type of each weld. Indicate net weld lengths.
 - 1.3.2.4.** Dimensions required to locate structural steel for manufactured items such as mechanical equipment, electrical equipment, etc., shall be coordinated and provided by the Contractor.
 - 1.3.2.5.** Shop drawings shall clearly identify, in graphic form, all deviations from contract documents. Provide complete description and rationale for deviation.
 - 1.3.2.5.1.** Where shop drawings propose deviations from contract documents, specific prior approval by Architect and Structural Engineer.
 - 1.3.2.6.** Shop Drawings shall be originals developed by Contractor. Copying of Engineers or Architects drawings is not acceptable.
 - 1.3.2.7.** Clearly identify all changes made in re-submitted shop drawings. Incorporate changes necessary due to field conditions in re-submittal.

1.3.3. Product Data/Materials List

- 1.3.3.1.** Submit producers or manufacturer's specifications and installation instructions for following products. Include laboratory test reports and other data to show compliance with specifications, including specified standards.
- 1.3.3.2.** Structural steel (each type), including certified copies of mill reports covering chemical and physical properties.
- 1.3.3.3.** Normal and high-strength bolts (each type), including nuts and washers.
- 1.3.3.4.** Structural steel primer paint.
- 1.3.3.5.** Non-shrink grout.
- 1.3.3.6.** Power driven fasteners, shot pins, and related items.

1.3.4. Welders' Certificates: Submit documentation to the Testing Laboratory stating welders have been qualified and have current certification in accordance with AWS D1.1. Welders shall have been certified for not less than 24 months and have received re-certification within past 12 months.

1.3.5. Record Drawing: Submit record drawing of as-placed framing as specified in this Section.

1.4. QUALITY ASSURANCE

1.4.1. Codes and Standards: Comply with provisions of following, except as otherwise indicated.

1.4.1.1. American Institute of Steel Construction (AISC): AISC 360 and AISC 341, including the "Commentaries" and Supplements thereto as issued.

1.4.1.2. American Welding Society (AWS): AWS D1.1, Structural Welding Code, latest edition.

1.4.1.2.1. The minimum requirements for a qualified welding inspector shall be as those for an AWS certified welding inspector (CWI), as defined in the provision of the Fourth Edition edition of AWS, QC 1, Standard for AWS Certification of Welding Inspectors.

1.5. QUALIFICATIONS

1.5.1. Manufacturer

1.5.1.1. Manufacturer shall have produced the specified products for a period of five (5) years prior to beginning work of this section, and shall have the capability to produce the specified products to the delivery and quantity criteria of the project.

1.5.1.2. Structural steel may be of domestic or imported origin, subject to compliance with specified criteria.

1.5.2. Fabricator/Erector

- 1.5.2.1.** For fabrication and installation of work, use only personnel who are thoroughly trained and experienced in the skills required, have installed similar applications of the specified products within one year prior to beginning work of this section, and who are completely familiar with the manufacturers' recommended methods of installation as well as the requirements of this work.
- 1.5.2.2.** Fabrication of structural steel shall only be done within the continental United States in accordance with specified criteria.
- 1.5.2.3.** Fabricator shall be approved by *the* jurisdictional authority as an approved fabricator of structural steel, including welding of structural joints.
- 1.5.2.4.** Installing Foreman: Individual specializing in work of this Section, with minimum 5 years documented experience in projects of similar scale and scope.

1.6. FIELD MEASUREMENTS

- 1.6.1.** Verify field measurements are as shown on shop drawings.

1.7. DELIVERY, STORAGE AND HANDLING

- 1.7.1.** Deliver and store on site under the provisions of Section 01 60 00.
- 1.7.2.** Store materials above ground, protected from dirt, grease, corrosion and other damage.
- 1.7.3.** Store all other materials in a waterproof manner.
- 1.7.4.** Provide original packaged welding electrodes, clearly marked as to type and rating.
- 1.7.5.** Do not store materials on structure in a manner causing potential distortion or damage to members, surfaces, or supporting structures.

1.8. SEQUENCING AND SCHEDULING

- 1.8.1.** Cooperate and coordinate this work with other trades for anchor bolts, and other required inserts, templates, etc. Align this work prior to installation of other materials.

2. PART 2 - PRODUCTS

2.1. MATERIALS

- 2.1.1.** W shapes: ASTM A 992.
- 2.1.2.** Channels, angles, plates, and bars: ASTM A 36.
- 2.1.3.** Square and rectangular Hollow Structural Sections (HSS): ASTM A 500, Grade B.
- 2.1.4.** Round Hollow Structural Sections (HSS): ASTM A 500, Grade B.
- 2.1.5.** Pipe: ASTM A53, Grade B, Type E or S.
- 2.1.6.** Threaded Fasteners:
 - 2.1.6.1.** Machine Bolts: Unless noted otherwise, ASTM A307, Grade A. Provide ASTM A563, Hex, Grade A Nuts and ASTM F 436 Washers.

- 2.1.6.2. Threaded Rods:
 - 2.1.6.2.1. ASTM A 36, unless noted otherwise on structural drawings.
- 2.1.6.3. Anchor Bolts/Anchor Rods:
 - 2.1.6.3.1. ASTM F 1554, Grade 36, where shown on structural drawings (or Grade 55 weldable or noted).
- 2.1.6.4. High Strength Bolts: ASTM A 325, with nuts complying with ASTM A563, heavy hex, Grade C. Approved load indicator washers may be used with Architect's prior approval.
- 2.1.6.5. Miscellaneous Fasteners: As indicated on drawings.
- 2.1.7. Welding Materials: AWS A5.1; E70XX electrodes, type as required for application. Use E80XX low hydrogen electrodes for welding reinforcing steel. Use E71TXX wire type for flux cored arc welding, type as required for application.
- 2.1.8. Grouts:
 - 2.1.8.1. Plastic Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 8,000 psi at 28 days tested in accordance with CRD C 621 and ASTM C 1107.
 - 2.1.8.2. Dry-Pack Grout: Portland cement (ASTM C150, Type I or Type II) and clean, uniformly graded, natural sand (ASTM C404, Size No. 2). Mix at a ratio of 1.0 part cement to 3.0 parts sand by volume, with minimum water required for placement and hydration.
- 2.1.9. Touch-up Primer for Galvanized Surfaces: Galvalloy or equal.
- 2.1.10. Primer: Approved VOC compliant primer, suitable for subsequent finishes as specified and shown in other portions of the Contract *Documents*.
- 2.2. CONNECTIONS: FABRICATION AND JOINTING CRITERIA
 - 2.2.1. General:
 - 2.2.1.1. Comply with requirements of referenced standards.
 - 2.2.2. Welding:
 - 2.2.2.1. Conform to AWS D1.1, as modified by referenced AISC Standards and as indicated or noted on the Drawings.
 - 2.2.2.2. Employ certified welders who are thoroughly trained and experienced in arc welding, produce uniformly reliable groove and fillet welds in flat, vertical and overhead positions, and make neat and consistent welds.
 - 2.2.2.3. Weld structural steel joints by the shielded metal electric-arc method, or by the flux cord arc welding – self shielded.
 - 2.2.2.4. Provide inspection and testing of welds as required under Article "Field Quality Control" of this section and per Section 01 45 00.

- 2.2.2.5.** Grind exposed welds subject to contact or visible in final construction to smooth surfaces free of holes, slag or other defects, flush with the adjoining surfaces. No finish treatment is required for permanently concealed welds and other exposed welds.
- 2.2.2.6.** During assembling and welding, hold components of a built-up member with adequate clamps or other means to keep parts straight and in close contact. Do no welding in wind until adequate protective screening has been set up. Cut out defective welds or parts of welds with a chisel or air arc and replace.
- 2.2.2.7.** Storage and Care of Electrodes:
 - 2.2.2.7.1.** Coatings of low-hydrogen type electrodes shall be thoroughly dry when used. After removal from container, electrodes shall be kept in heating quiver until immediately prior to use.
 - 2.2.2.7.2.** Use electrodes as taken from hermetically sealed packages within 4 hours of the time the package is opened. Electrodes not used within this 4 hour period and electrodes that have been exposed more than one hour to air having a relative humidity of 75 percent or greater shall be re-dried for at least two hours at a temperature of 500 to 800 degrees Fahrenheit before they are used or shall be reconditioned according to the manufacturer's recommendations.
 - 2.2.2.7.3.** Electrodes so dried or reconditioned not used within 4 hours after drying is completed shall be discarded.
 - 2.2.2.7.4.** Electrodes of any class that have been wet shall not be used under any conditions.

2.2.3. High Strength Steel Bolting:

- 2.2.3.1.** For joints connected by high-strength steel bolts, and hardened washers, the materials, method of installation and tension control, type of wrenches, and inspection shall conform to the Reference Standards and the following requirements.
- 2.2.3.2.** High-strength bolts shall have a suitable identifying mark placed on top of the head before leaving the factory.
- 2.2.3.3.** Fully tightened bolts shall be marked with identifying symbol.
- 2.2.3.4.** Bolts in non-slip-critical connections shall be in properly aligned holes, but need only be tightened to the snug tight condition.
- 2.2.3.5.** Hardened washers shall be provided and installed in accordance with AISC Specification for Structural Joints Using ASTM A325 or A490 Bolts.
- 2.2.3.6.** Clean all contact surfaces of bolted parts and threads free of scale, slag, burrs, and pits, or dirt, paint, or other foreign material or defects which would prevent solid seating of parts.

2.2.3.6.1. For the faying surfaces of slip critical connections, paint, including any inadvertent overspray, shall be excluded from the areas closer than one bolt diameter, but not less than one inch from the edge of any hole and all areas within the bolt pattern.

2.2.3.7. Bolt lengths shall be the grip plus 1-1/4 inch.

2.3. SHOP FINISHING

2.3.1. General:

2.3.1.1. Prepare in accordance with referenced specification standards. Unless specified otherwise, shop prime all structural steel.

2.3.1.2. Do not prime areas within 4 inches of field welds..

2.3.1.3. Surfaces of steel members designated to receive steel decking.

2.3.1.4. Do not galvanize or shop prime structural steel embedded in concrete.

2.3.1.5. Do not shop prime galvanized structural steel, or steel concealed in final construction.

2.3.1.6. Do not shop prime structural steel designated as fire proofed.

2.3.2. Shop Prime Painting:

2.3.2.1. Clean steel in accordance with SSPC-SP-2 or SSPC-SP-3 criteria.

2.3.2.2. Apply shop coat per SSPC-Paint 2 criteria, minimum 1.5 mil thickness.

2.3.2.3. Work primer into joints, corners, and edges.

2.3.2.4. Block out at connections and omit shop primer.

2.4. SOURCE QUALITY CONTROL

2.4.1. Structural Shapes:

2.4.1.1. Identified Structural Steel: Tests are waived for steel identified by heat number, accompanied by mill analyses and mill test reports and properly tagged with Identification Certificate so as to be readily identified for conformance with applicable ASTM standard.

2.4.1.2. Unidentified Steel: If structural steel cannot be identified or its source is questionable, not less than one tension and one bend test shall be made for each 5 tons or fractional part thereof. Additional tests may be required when deemed necessary by the Architect, Structural Engineer. Contractor shall bear test costs.

2.4.2. Threaded Connections:

2.4.2.1. Random inspection of shop fabrication procedures may be performed by Owner's testing service without notification.

2.4.3. High-Strength bolts, nuts and washers.

2.4.3.1. American Institute of Steel Construction (AISC), Steel Construction Manual.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection:

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards. Verify existing construction complies with the following tolerances:

3.1.1.2.1. Top of Anchor Bolt Tolerance: plus 1 inch, minus 3/8 inch.

3.1.1.2.2. Anchor bolt alignment/position: plus/minus 1/8 inch.

3.1.1.2.3. Elevation of concrete bearing surface: plus/minus 3/8 inch.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. ERECTION

3.2.1. Comply with requirements of reference standards as applicable to the work of this Section.

3.2.2. Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.

3.2.3. Field weld components indicated on drawings. Do NOT field cut or alter structural members without approval of Architect.

3.2.4. Mark each member with erection identification corresponding to mark shown on erection drawings. Carefully plan erection of structural steel so that no cutting and removal of material will be necessary. Do not torch burn in the field, unless specifically permitted by Engineer.

3.2.5. Set center of base true to column center within 1/16 inch and adjust height to within tolerance of plus/minus 1/32 inch. Maintain bases in position and level during grouting.

3.2.6. Clean bearing surfaces of concrete or masonry prior to installation of base or bearing plates. Remove dust dirt, laitance, and other material which may impair bond.

3.2.7. Level base and bearing plates with double nuts on steel shims. Remove template prior to erection. Tighten anchor bolts after supported members have been positioned.

3.2.8. Cut off portions of shims which protrude beyond edges of base or bearing plates prior to grouting.

- 3.2.9.** Grout under base plates following grout manufactures instructions. Place grout and consolidate to ensure no voids remain. Finish exposed surfaces and allow to cure.
- 3.2.10.** After erection, touch up welds, abrasions, and surfaces of exterior galvanized members, except surfaces to be in contact with concrete. Touch up primer with approved primer paint.
- 3.2.11.** Connections:
- 3.2.11.1.** Maintain steel in correct position during welding and bolting and provide for dead loads, wind and all erection stresses. Drifting to enlarge unfair holes not permitted.
 - 3.2.11.2.** Do not weld or final bolt until members have been aligned and plumbed.
 - 3.2.11.3.** Field welding shall conform to requirements for shop fabrication.
 - 3.2.11.4.** Tighten and upset common bolt threads to preclude loosening or use approved self-locking nuts.
 - 3.2.11.5.** Tighten high strength bolted connections as specified for high strength bolting and according to AISC Standards, and the Referenced Standards.
 - 3.2.11.5.1.** Installation and tightening shall comply with the requirements for joint assembly and tightening of shear/bearing connections. Full pre-tensioning of connections is not required.
 - 3.2.11.5.2.** Re-use of high strength bolts is prohibited.

3.3. ERECTION TOLERANCES

- 3.3.1.** Tolerances shall conform to referenced AISC standards and AISC Code, including the Code of Standard Practice, and as specified. Tolerances shall be compensating, not cumulative.
- 3.3.1.1.** All columns and beams shall be free of twists, bends, and open joints.
 - 3.3.1.2.** Take special care that column base plates are parallel and perpendicular to faces of columns and that bolt holes are accurately placed.
- 3.3.2.** Vertical Dimensions shall be measured from top of beams at their connections at any column with variation of not more than 1/4 inches plus or minus per story or, when variations are accumulative from floor to floor, not exceeding 3/8 inches per story exclusive of column shortening due to dead load.
- 3.3.3.** Unless specified otherwise, plumb displacement shall be measured by the center line of columns from established column line varying no more than slope ratio of 1/500 per story from established center line.
- 3.3.4.** Place each vertical member on such grids so that its vertical center line does not vary by more than 1/2 inch from a vertical line for each story and 1 inch for its full height.
- 3.3.5.** Place all steel framing at the exterior walls of the building, so that the center lines of such framing does not vary by more than 1 inch for the length of the building.

- 3.3.6. Floor elevation will be considered level if floor framing members on any one floor, measured from established floor elevations, do not vary more than 3/8 inch, plus or minus, excluding camber.
- 3.3.7. Horizontal dimension variance shall be governed by column plumb displacement tolerance.

3.4. FIELD QUALITY CONTROL

- 3.4.1. Field inspection shall be performed under provisions of Section 01 45 00.
- 3.4.2. Inspection and Testing of End-Welded Stud Connectors:
 - 3.4.2.1. Conform to testing requirements of Section 1704.3.
- 3.4.3. Inspection of Welding:
 - 3.4.3.1. Conform to testing and inspection requirements of Section 1704.3.
 - 3.4.3.2. Inspector shall be certified in accordance with AWS QC1 CW 1 program.
- 3.4.4. Inspection of High-Strength Bolts:
 - 3.4.4.1. The testing service shall check bolt tightness on a minimum of 10 percent of bolts, selected at random, for each non-slip-critical strength bolted joint.
 - 3.4.4.2. Inspection procedure shall conform to Section 1704.3.
- 3.4.5. Inspection of Shop Fabrication:
 - 3.4.5.1. Conform to testing and inspection requirements of Section 1704.3.
- 3.4.6. Nondestructive Testing:
 - 3.4.6.1. As noted on Structural Drawings.

END OF SECTION

SECTION 05 21 19
OPEN WEB STEEL JOIST FRAMING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Open web steel roof joints.

1.1.2. Accessories.

1.2. REGULATORY REQUIREMENTS

1.2.1. Comply with International Building Code (IBC) Chapter 22.

1.3. REFERENCES

1.3.1. ASTM A36 – Structural Steel.

1.3.2. ASTM A108 – Steel Bars, Carbon, Cold Finished, Standard Quality.

1.3.3. ASTM A123 – Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products.

1.3.4. ASTM A153 – Zinc Coating (Hot Dip) on Iron and Steel Hardware.

1.3.5. ASTM A307 – Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

1.3.6. AWS A2.0 – Standard Welding Symbols

1.3.7. AWS D1.1 – Structural Welding Code

1.3.8. AWS D1.3 – Structural Welding Code – Sheet Steel.

1.3.9. AWS D1.4 – Structural Welding Code – Reinforcing Steel.

1.3.10. SSPC Steel Structures Painting Council.

1.3.11. SJI (Steel Joint Institute) – Specifications, Load tables, and Weight Tables for Steel Joists and Joist Girders.

1.3.12. UL – Fire Resistance Directory

1.4. SUBMITTALS

1.4.1. Submit under provisions of Section 01 33 00.

1.4.2. Shop Drawings:

1.4.2.1. Submit shop drawings prepared under supervision of a registered structural engineer, licensed in the State of Arizona.

1.4.2.2. Shop drawings shall include complete details and procedures and diagrams. Include details of cuts, connections, camber, holes, and other pertinent data.

- 1.4.2.3.** Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as work of other sections.
- 1.4.2.4.** Indicate welds by standard AWS A2.1 and A2.4 symbols, and show size, length, sequence, and type of each weld. Indicate net weld lengths.
- 1.4.2.5.** Shop drawings shall clearly identify, in graphic form, all deviations from contract documents. Provide complete description and rationale for deviation.
- 1.4.2.6.** Clearly identify all changes made in re-submitted shop drawings. Incorporate changes necessary due to field conditions in re-submittal.

1.4.3. Product Data/Materials List

- 1.4.3.1.** Submit producers or manufacturer's specifications and installation instructions.

1.4.4. Engineering Submittal Criteria:

- 1.4.4.1.** Submit calculations prepared under the direct supervision of a Professional Engineer licensed in the State of Arizona.

1.4.5. Welder's Certificates: Submit certification stating welders have been certified and comply with AWS qualifications within the previous 12 months.

1.4.6. Certification

- 1.4.6.1.** Provide written certification from the fabricator and the erector certifying steel joints were fabricated and erected in accordance with the Contract Documents.

1.5. QUALITY ASSURANCE

- 1.5.1.** Comply with Steel Joist Institute, Standard Specifications for Long Span Steel Joists.

1.6. QUALIFICATIONS

1.6.1. Manufacturer

- 1.6.1.1.** Manufacturer shall have produced the specified products for a period of five (5) years prior to beginning work of this section, and shall have the capability to produce the specified products to the delivery and quantity criteria of the project.
- 1.6.1.2.** Unless noted otherwise, structural steel may be of domestic or imported origin, subject to compliance with specified criteria.

1.6.2. Fabricator/Erector

- 1.6.2.1.** For fabrication and installation of work, use only personnel who are thoroughly trained and experienced in the skills required, have installed similar applications of the specified products within one year prior to beginning work of this section, and who are completely familiar with the manufacturers' recommended methods of installation as well as the requirements of this work.

- 1.6.2.2.** All fabrication of steel joists shall be by a member of the Steel Joist Institute or by a firm approved by the Steel Joist Institute.
- 1.6.2.3.** Fabricator shall be currently licensed and approved by jurisdictional authority as an approved fabricator of structural steel, including welding of structural joists.
- 1.6.2.4.** Provide steel joist fabricator within the continental United States in accordance with specified criteria

1.7. FIELD MEASUREMENTS

- 1.7.1.** Verify field measurements are as shown on shop drawings.

1.8. DELIVERY, STORAGE AND HANDLING

- 1.8.1.** Deliver and store on site under the provisions of Section 01 60 00.
- 1.8.2.** Store materials above ground, protected from dirt, grease, corrosion and other damage.
- 1.8.3.** Store all other materials in a waterproof manner.
- 1.8.4.** Provide original packaged welding electrodes, clearly marked as to type and rating.
- 1.8.5.** Do not store materials on structure in a manner causing potential distortion or damage to members, surfaces, or supporting structures.

2. PART 2 – PRODUCTS

2.1. MATERIALS

- 2.1.1.** Steel: Conform to pertinent ASTM standard designations, with minimum yield point of 36,000 psi, maximum yield point of 50, 000 psi.
- 2.1.2.** Where steel is cold rolled to achieve required strengths, test in accordance with ASTM A-370.

2.2. ACCESSORY PRODUCTS

- 2.2.1.** Machine Bolts: ASTM A307, Grade A, and ANSI, B1i.1 and B18.2. Provide ASTM A563, Hex, Grade A Nuts and Washers.
- 2.2.2.** Anchor Bolts: ASTM A307, Grade A.
- 2.2.3.** Welding Materials: AWS D5.1; E60XX or E70XX electrodes, type as required for application.
- 2.2.4.** Grouts
 - 2.2.4.1.** Plastic Grout: Non-shrink type, pre-mixed compounds consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 8,000 psi at 28 days.

2.2.4.2. Dry-Pack Grout: Portland cement (ASTM C150, Type I or Type II) and clean, uniformly graded, natural sand (ASTM C404, Size No. 2). Mix at a ratio of 1.0 part cement to 3.0 parts sand by volume, with minimum water required for placement and hydration.

2.2.5. Primer: Approved VOC compliant primer, suitable for subsequent finishes as specified and shown in other portions of the Contract Documents.

2.3. MANUFACTURER AND SERIES

2.3.1. Manufacturer: Nucor - Vulcraft Division or equal.

2.3.2. Series: Roof Joist Application: Series K- Series.

2.4. SHOP FINISHING

2.4.1. General

2.4.1.1. Prepare in accordance with referenced specification standards.

2.4.1.2. Do not prime steel joists designated as fire proofed.

2.4.2. Shop Prime Painting

2.4.2.1. Clean steel in accordance with SSPC-SP-2 or SSPC=SP-3 criteria.

2.4.2.2. Apply shop coat per SSPC-Paint 2 criteria, minimum 1.5 mil thickness.

2.4.2.3. Work primer into joints, corners, and edges.

2.4.2.4. Block out at connections and omit shop primer.

2.5. DESIGN AND FABRICATION

2.5.1. Comply with design criteria as defined by IBC Chapter 22.

2.5.1.1. Provide roof system designed for live loads as shown on drawings.

2.5.1.2. Dead Loads: Carefully review drawings and references sections of this specification. Design structural system to respond to loads imposed by such materials and assemblies as specified.

2.5.1.3. Deflection: Limit deflection to criteria indicated on structural drawings.

2.5.2. Include all extended ends and ceiling extensions, headers, bridging, end supports, and end anchors required for complete installation.

2.5.3. Fabrication

2.5.3.1. Fabricate in accordance with the approved Shop Drawings and IBC Chapter 22.

2.6. OTHER MATERIAL

2.6.1. All other materials, not specifically described but required for complete and proper installation of steel joists, shall meet or exceed referenced standards, the manufacturer's recommendations and shall be subject to the approval of the Architect.

3. PART 3 – EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

- 3.1.1.1.** Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
- 3.1.1.2.** Verify that steel joists may be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.
- 3.1.1.3.** In the event of discrepancy, immediately notify the Architect.
- 3.1.1.4.** Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

- 3.2.1.** Install open-web steel joists in strict accordance with the Drawings, the approved Shop Drawings, and IBC Chapter 22.
- 3.2.2.** Place joists, bridging and bridging anchors before placing construction loads on the joists. During the course of construction, provide separate means for adequate distribution of concentrated loads where such loads occur in order to prevent exceeding the designed capacity of the open-web steel joists.
- 3.2.3.** After installation is complete, touch-up all priming coat damaged during transportation or erection and prime-coat all field welds, using the priming paint specified for shop priming.
- 3.2.4.** Do not field cut or alter structural members without approval of Architect.
- 3.2.5.** Coordinate placement and anchorage requirements of base plates, bolts and other anchorage components specified in other sections.
- 3.2.6.** Clean bearing surfaces of steel connection points prior to installation of base or bearing plates. Remove dust, dirt, laitance, and other material.
- 3.2.7.** Grout under base plates following grout manufacturers instructions. Pack grout solidly to ensure no voids remain. Finish exposed surfaces and allow to cure.
- 3.2.8.** Do not permit installation of decking until joists are braced and secured or until completion of erection and installation of permanent bridging and bracing.
- 3.2.9. Connections**
 - 3.2.9.1.** Maintain joist in correct position during welding and bolting.
 - 3.2.9.2.** Do not weld or final bolt until members have been aligned and plumbed.
 - 3.2.9.3.** In field welding, do not damage the joists.

- 3.2.9.4.** The total length of weld at any one point on cold-formed member whose yield point has been attained by cold-working and whose as-formed strength is used in the design shall not exceed 50% of the over-all developed width of the cold-formed section.
- 3.2.9.5.** After joist alignment and installation of framing, field weld joist seat to bearing plates or angles. Field welding shall conform to requirements for shop fabrication.
- 3.2.9.6.** Tighten and upset common bolt threads to preclude loosening or use approved self-locking nuts.

3.3. ERECTION TOLERANCES

- 3.3.1.** Tolerances shall conform to referenced SJI standards. Tolerances shall not be cumulative.
- 3.3.2.** Install joists aligned within 1/4 inch true location.
- 3.3.3.** Install joist plumb and level, plus or minus 1/4 inch in 10 feet.

3.4. FIELD QUALITY CONTROL

- 3.4.1.** Field inspection will be performed under provisions of Section 01 45 29.
- 3.4.2.** Inspection of Welding
 - 3.4.2.1.** Conform to testing and inspection requirements of IBC Chapter 17 and 22.

END OF SECTION

SECTION 05 31 00

STEEL DECKING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Steel roof decking and accessories.
- 1.1.2.** Framing for minor openings.
- 1.1.3.** Bearing plates and angles.

1.2. REFERENCES

- 1.2.1.** AISI - Specification for the Design of Cold-Formed Steel Structural Members.
- 1.2.2.** ASTM A36 - Structural Steel.
- 1.2.3.** ASTM A 653, Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron-Alloy Coated (Galvannealed) by the Hot-Dip Process.
- 1.2.4.** AWS D1.1 - Structural Welding Code.
- 1.2.5.** AWS D1.3 - Structural Welding Code - Sheet Steel.

1.3. SUBMITTALS

- 1.3.1.** Submit under provisions of Section 01 33 00.
- 1.3.2.** Shop Drawings: Indicate decking plan, support locations, projections, openings and reinforcement, pertinent details, and accessories. Indicate temporary shoring of decking where required.
- 1.3.3.** Product Data: Provide deck profile characteristics and dimensions, structural properties, and finishes.
 - 1.3.3.1.** Provide current ICC ES report.
 - 1.3.3.2.** Provide certification as required by Architect of compliance with criteria as specified and as shown on drawings.
- 1.3.4.** Certification: Provide certification that submitted deck is coordinated with fire resistant assemblies as specified and shown on drawings, including gage, span, and deck type.
- 1.3.5.** Welder Certification: Provide documentation to Testing Laboratory certifying welders have been qualified and have current certification in accordance with AWS D1.1. Welders shall have been certified for not less than 24 months and have received re-certification within past 12 months.

1.4. QUALIFICATIONS

- 1.4.1.** Contractor Qualifications

- 1.4.1.1.** Installing Company: Company specializing in installation of work of this Section, with minimum 5 years documented experience in installation of projects of similar scale and scope.
- 1.4.1.2.** Installing Foreman: Individual specializing in installation of work of this Section, with minimum 5 years documented experience in installation of projects of similar scale and scope.
- 1.4.1.3.** Use only staff that are completely familiar with the manufacturers' recommended methods of installation as well as the requirements of this work.

1.5. DELIVERY, STORAGE, AND HANDLING

- 1.5.1.** Deliver products to site under provisions of Section 01 60 00.
- 1.5.2.** Store and protect products under provisions of Section 01 60 00.
- 1.5.3.** Cut plastic wrap to encourage ventilation.
- 1.5.4.** Separate sheets and store decking on dry wood sleepers; slope for positive drainage.

1.6. FIELD MEASUREMENTS

- 1.6.1.** Verify field measurements are as shown on Drawings.

2. PART 2 - PRODUCTS

2.1. METAL ROOF DECK

- 2.1.1.** Manufacturer: Verco or equal.
- 2.1.2.** Series: HSB-36/PLB-36, or PLN-24/N-24 as indicated on drawings,
- 2.1.3.** Characteristics:
 - 2.1.3.1.** Sheet Steel: ASTM A 653, SS, Grade 33, with minimum yield strength of 33,000 psi.
 - 2.1.3.2.** Minimum Metal Thickness: As indicated on the structural drawings.
 - 2.1.3.3.** Nominal Height:
 - 2.1.3.4.** Formed Sheet Width: As indicated on the structural drawings.
- 2.1.4.** Fire Rating: Provide decking complying with fire rated assembly as defined on drawing.
- 2.1.5.** Finish: As indicated on the structural drawings.
 - 2.1.5.1.** Where steel is designated as painted in finished project, do not water quench or apply chromate conversion coatings as a part of the galvanizing process. Contractor shall notify steel galvanizing fabricator of all steel designated as painted.

2.2. ACCESSORIES

- 2.2.1.** Flute Closures:

- STEEL DECKING
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2.5. OTHER MATERIALS

- 2.5.1.** Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

- 3.1.1.1.** Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
- 3.1.1.2.** Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
- 3.1.1.3.** In the event of discrepancy, immediately notify the Architect.
- 3.1.1.4.** Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

- 3.2.1.** Erect metal decking in accordance with SDI Design Manual for Composite Decks, Form Decks and Roof Decks. Install metal deck units and accessories in accordance with the drawings, manufacturer's recommendations and final shop drawings, and as specified herein.
- 3.2.2.** Do not start placement of deck units before all supporting members are installed.
- 3.2.2.1.** Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before being permanently fastened.
- 3.2.2.2.** Lap ends not less than 2 inches where lap is indicated on drawings. Do not stretch or contract the side-lap interlocks
- 3.2.2.3.** Deck units shall have a minimum of 2 inches solid bearing at all support points.
- 3.2.2.4.** Exercise special care in holding sheets tight against structural steel when welding through double thickness of decking.
- 3.2.3.** Place deck units flat and square, secured to adjacent framing without warp or excessive deflection.
- 3.2.4.** Do not place deck units on concrete supporting structure until concrete has cured properly and is dry.
- 3.2.5.** Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.

- 3.2.6.** Do not use deck units for storage or working platforms until permanently secured in position.
- 3.2.7.** Permanently fasten deck units to steel supporting members as noted on Structural Drawings.
- 3.2.8.** Cutting and Fitting: Cut and fit deck units and accessories around other work projecting through or adjacent to the decking. Provide neat square and trim cuts.
- 3.2.9.** Reinforcement at Openings: Unless shown otherwise on drawings, reinforce steel deck openings from 6 to 18 inches in size with 2-1/2 x 2-1/2 x 3/16 inch steel angles. Place angles perpendicular to flutes. Extend minimum three flutes beyond each side of opening and fusion weld to deck at each flute. Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking and support of other work shown.
- 3.2.10.** Weld in accordance with AWS D1.1 and D1.3.
- 3.2.11.** Fasten weld male/female side laps at intervals indicated on the Drawings.
- 3.2.12.** Install 6 inch minimum wide sheet steel cover plates, of same thickness as decking, where deck changes direction.
- 3.2.13.** Roof Sump Pans: Place over opening provided in the roof decking and weld to the top decking surface. Space welds not more than 12 inches o.c. with at least one weld at each corner. Cut opening in the bottom of the roof sump to accommodate the drain size indicated.
- 3.2.14.** Cant Strips: Where shown, weld to the top surface of the roof decking, and secure to wood nailers with galvanized nails, and to steel framing with welds or galvanized self-tapping screws. Space fasteners or welds at 12 inches on center. Lap end joints not less than 3 inches, and secure with galvanized sheet metal screws.
- 3.2.15.** Closure Strips: Provide metal closure strips at all open uncovered ends and edges of roof decking, and in the voids between decking and other construction. Weld into position to provide a complete decking installation.
- 3.2.16.** Roof Insulation Support: Provide metal closure strips for the support of roof insulation where the rib openings in the top surface of roof decking occur adjacent to edges and opening. Weld closure strips into position.
- 3.2.17.** Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up coating. Wire brush, clean and paint scarred areas, welds and rust spots on top and bottom surfaces of decking units and supporting steel members.
 - 3.2.17.1.** Touch-up painted surfaces with same type of shop paint used on adjacent surfaces.
 - 3.2.17.2.** In areas where shop-painted surfaces are to be exposed, apply touch-up paint to blend adjacent surfaces.

3.3. FIELD QUALITY CONTROL

- 3.3.1.** Testing and inspection will be performed under the provisions of Section 01 45 29
 - 3.3.1.1.** Welding: IBC Section 1704.3.

- 3.3.2.** Inspection and Testing: Type and capacity of welding equipment shall be checked and approved by welding inspector. Perform inspection of all shop and field welding in accordance with AWS D1.1 and D1.3, as applicable.
- 3.3.2.1.** Special Inspector shall inspect all field welded conditions by approved non-destructive test methods.
- 3.3.2.2.** Conform to jurisdictional authority requirements for re-inspection of welds after installation.

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

1. PART 1 - GENERAL

1.1. SECTION INCLUDE

- 1.1.1.** Miscellaneous fabricated ferrous metal items, galvanized, plated, and prime painted.
- 1.1.2.** Miscellaneous fabricated structural connectors and clips.
- 1.1.3.** Handrails and Guardrails
- 1.1.4.** Bollards: Galvanized steel pipe; concrete filled, crowned cap.

1.2. PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- 1.2.1.** Section 03 30 10 - Cast-In-Place Concrete.

1.3. REFERENCES

- 1.3.1.** ASTM A36 - Structural Steel.
- 1.3.2.** ASTM A53 - Pipe, Steel, Black and Hot Dipped, Zinc-Coated Welded and Seamless.
- 1.3.3.** ASTM A123 - Zinc (Hot-Galvanized) Coatings on Iron and Steel Products.
- 1.3.4.** ASTM A283 – Low and Intermediate Tensile Strength Carbon Steel Plates.
- 1.3.5.** ASTM A307 - Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- 1.3.6.** ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
- 1.3.7.** ASTM A 653, Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron-Alloy Coated (Galvannealed) by the Hot-Dip Process.
- 1.3.8.** AWS A2.0 - Standard Welding Symbols.
- 1.3.9.** AWS D1.1 - Structural Welding Code.
- 1.3.10.** SSPC - Steel Structures Painting Council.

1.4. SUBMITTALS

- 1.4.1.** Submit under provisions of Section 01 33 00.
- 1.4.2.** Product Data: Provide data on material, finishes and attachment.
- 1.4.3.** Manufacturer's Installation Instructions: Submit criteria for preparation and application.
- 1.4.3.1.** Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

- 1.4.3.2.** Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.

1.5. QUALITY ASSURANCE

- 1.5.1.** Manufacturer: Manufacturer shall have produced the specified system or products for a period of one (1) year prior to beginning work of this section, and shall have the capability to produce the specified products to the delivery and quantity criteria of the project.

- 1.5.2.** Staff:

- 1.5.2.1.** Use only personnel who are thoroughly trained and experienced in the skills required and have installed similar applications of the specified products within one year prior to beginning work of this section.

- 1.5.2.2.** Use only staff who are completely familiar with the manufacturers' recommended methods of installation as well as the requirements of this work.

- 1.5.3.** Welders' Certificates: Submit under provisions of Section 01 33 00, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.6. FIELD MEASUREMENTS

- 1.6.1.** Verify that field measurements are as indicated on shop drawings.

1.7. WARRANTY AND GUARANTEE

- 1.7.1.** Contractors Guarantee:

- 1.7.1.1.** Provide, in Architect approved form, the Owner with a guarantee against the following specific defects or failures for a period of three (3) years after Notice of Substantial Completion:

- 1.7.1.1.1.** Panel failure not resulting from anchorage and attachments.
- 1.7.1.1.2.** Rusting and coating failure resulting from field installation.
- 1.7.1.1.3.** Settlement and alignment resulting from footing embedment and earthwork failure.

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

- 2.1.1.** Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. MATERIALS

- 2.2.1.** Plates and Bars: ASTM A283, Grade D or approved equal.

- 2.2.2.** Pipe: ASTM A53, Grade B Schedule 40, (pressure test not required), unless noted otherwise.

- 2.2.3.** Tube: ASTM A 500, Grade B.
- 2.2.4.** Sheet Steel: ASTM A 653, gage and profile indicated, galvanized to G90 finish in accordance with ASTM A 653.
- 2.2.5.** Bolts, Nuts, and Washers: ASTM A307 galvanized to ASTM A153 for galvanized components.
- 2.2.6.** Welding Materials: AWS D1.1; type required for materials being welded.
- 2.2.7.** Shop and Touch-Up Primer: VOC approved primer.
 - 2.2.7.1.** Primer VOC to comply with Section 01 35 44 LEED Requirements.
- 2.2.8.** Touch-Up Primer for Galvanized Surfaces: Zinc rich Type.
- 2.2.9.** Copper: ASTM B370, temper H00 (cold rolled) or 060 (soft), 16 ounce unless noted otherwise.
- 2.2.10.** Solder: 50% pig lead and 50% block tin.
- 2.2.11.** Flux: Rosin, muriatic acid neutralized with zinc or an approved soldering paste.
- 2.2.12.** Fastening Devices for Copper: Hard copper, brass or bronze. Screws shall be round headed with lead washers.

2.3. STRUCTURAL SHAPES

- 2.3.1.** Provide structural shapes in accordance with Section 05 12 00. STEEL PAN STAIR ASSEMBLY
- 2.3.2.** General
 - 2.3.2.1.** Comply with fabrication requirements specified below.
- 2.3.3.** Material Characteristics
 - 2.3.3.1.** Treads and risers: Hot rolled steel, 14 gauge, per ASTM A 5691011.
 - 2.3.3.2.** Treads and Landings: Diamond-Grip walkway channels as manufactured by Amico, 800-665-4474, one-piece cold formed steel planks, 14 gauge, per ASTM A 1011.
 - 2.3.3.3.** Landing Plates: Hot rolled steel, 12 gauge minimum , per ASTM A 5691011.
 - 2.3.3.4.** Stair Stringer: Steel channel, ASTM A 36, size as required for span and load.
 - 2.3.3.5.** Flight Header/Landing Channel: Steel channel, ASTM A 36, size as required for span and load.
- 2.3.4.** Finish: VOC Compliant primer.
 - 2.3.4.1.** Primer VOC to comply with Section 01 35 44 LEED Requirements.

2.4. STEEL RAILING SYSTEM

- 2.4.1.** Steel Pipe: ASTM A53, Grade B.
- 2.4.2.** Rails and Posts: Size, shape and spacing as shown on the Drawings, welded joints.
 - 2.4.2.1.** Handrail: 1 inch NPS (1.33 inch OD), Schedule 80, welded joints.
- 2.4.3.** Fittings: Elbows, T-shapes, wall brackets; bent or mitered tube steel.
- 2.4.4.** Metal Pipe Support Mounting: Provide solid steel rod, bent as shown on drawings. Fabricate as required to provide 1-1/2 inch clear dimension from face of wall surface to railing inside surface.
- 2.4.5.** Mounting: Adjustable brackets and flanges, with steel inserts for casting in concrete. Prepare backing plate for mounting in framed wall construction. Modify bracket as required to provide 1-1/2 inch clear dimension from face of wall surface to railing inside surface.
- 2.4.6.** Splice Connectors: Steel welding inserts.
- 2.4.7.** Grout: Non-shrink, non-metallic as specified in Section 03 30 10.

2.5. PIPE BOLLARDS

- 2.5.1.** Provide galvanized extra strong weight steel pipe as specified in ASTM A 53. Anchor posts in concrete [and fill solidly with concrete with minimum compressive strength of 2500 psi.
- 2.5.2.** Fixed Pipe Bollard: 6 inch diameter galvanized steel pipe, concrete filled as indicated on drawings.
- 2.5.3.** Removable Pipe Bollard: Assembly consisting of a removable 6 inch diameter galvanized steel pipe set in pipe sleeve as indicated on drawings.

2.6. FABRICATION

- 2.6.1.** Fit and shop assemble in each item in largest practical sections, for delivery to site.
- 2.6.2.** Fabricate items with joints tightly fitted and secured.
- 2.6.3.** Continuously seal joined members by continuous welds.
- 2.6.4.** Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- 2.6.5.** Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- 2.6.6.** Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- 2.6.7.** Fabricate radiused components by cold-rolled process, using equipment and techniques resulting in crimp free surfaces. Verify component wall thickness is suitable for rolling without flattening or crimping.

2.6.8. In addition to above criteria, fabricate railing, trellis and fencing components for exposed architectural appearance conditions.

2.6.8.1. Remove all weld splatter, grind and sand all weld joints uniformly smooth, without visible scratches, gouges, or patch marks. Conform to Finish #2 of National Ornamental and Miscellaneous Metals Association "Joint Finish Guidelines."

2.6.8.2. All visible welds shall be continuous; bead or spot welding not acceptable.

2.6.8.3. Provide tube closures at all tube and pipe components.

2.6.9. Grind edges of all bent and fabricated components smooth to a 1/4 inch radius. Stair fabrication criteria:

2.6.9.1. Comply with all previously specified criteria and the following criteria.

2.6.9.2. Comply with all applicable stair design criteria as established in Title 24, Part 2, Chapter 16A, CCR.

2.6.9.3. Prepare complete engineering analysis of all loads. Provide stair shop drawings and signed calculations indicating compliance with engineering analysis.

2.7. FINISHES

2.7.1. Galvanize all exterior components, after fabrication, in accordance with ASTM A123 or A386. Provide minimum 2.00 oz/sq ft galvanized coating. Fill vent holes after galvanizing.

2.7.1.1. Where steel is designated as painted in finished project, do not water quench or apply chromate conversion coatings as a part of the galvanizing process. Contractor shall notify steel galvanizing fabricator of all steel designated as painted.

2.7.2. Prime paint interior items with one coat rust inhibitive VOC approved primer compatible with finish specified in Section 09 91 00.

2.7.2.1. Prepare surfaces to be primed in accordance with SSPC SP 2.

2.7.2.2. Do not prime surfaces in direct contact with concrete or where field welding is required.

2.8. MISCELLANEOUS METAL FABRICATIONS AND ACCESSORIES

2.8.1. Unistrut: Provide Unistrut assemblies as shown on drawings

2.9. OTHER MATERIALS

2.9.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

- 3.1.1.1.** Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
- 3.1.1.2.** Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
- 3.1.1.3.** In the event of discrepancy, immediately notify the Architect.
- 3.1.1.4.** Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

- 3.2.1.** Clean and strip primed steel items to bare metal where site welding is required.
- 3.2.2.** Supply items required to be cast into concrete or embedded in masonry with setting templates, to appropriate sections.

3.3. INSTALLATION

- 3.3.1.** Install items plumb and level, accurately fitted, free from distortion or defects.
- 3.3.2.** Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- 3.3.3.** Perform field welding in accordance with AWS D1.1.
- 3.3.4.** After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.
 - 3.3.4.1.** Use primer as specified in above for interior steel fabrications.
 - 3.3.4.2.** Use Galvalloy galvanizing coating in accordance with manufacturer's instructions for exterior steel fabrications.
- 3.3.5.** Install all railing and guardrail in accordance with applicable codes and regulations. Maintain all required clearances and dimensions, including the following:
 - 3.3.5.1.** Maintain continuous 1-1/2 inch clear dimension between handrail and adjacent wall.
 - 3.3.5.2.** Maintain railing, guardrail, and adjacent surface configuration so that a sphere 4 inches in diameter cannot pass through any opening or gap created.
 - 3.3.5.3.** Do not permit railing fabrication and installation to extend into required exit dimension at stairway.

3.4. INSTALLATION OF PIPE BOLLARDS

- 3.4.1.** Pipe guards shall be set vertically in concrete piers. Piers shall be constructed of, and the hollow cores of the pipe filled with, concrete [specified in Section 03 33 10 Cast-In-Place Concrete.] [having a compressive strength of 3000 psi.

3.5. ERECTION TOLERANCES

- 3.5.1.** Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- 3.5.2.** Maximum Offset From True Alignment: 1/4 inch.

3.6. SCHEDULED FABRICATION

- 3.6.1.** The following is a list of principal items only. Refer to Drawing details for items not specifically scheduled.
- 3.6.2.** Railings: Fabricate as shown on drawings, with steel mounting brackets and attachments; prime paint at interior locations; galvanized finish for exterior locations.
- 3.6.3.** Miscellaneous Anchorages: Anchor bolts, machine bolts, eye bolts, dowels, threaded rods, plates, inters, and other fastenings to be installed in concrete or masonry; provide as detailed or indicated.

END OF SECTION

SECTION 07 19 00
WATER-REPELLENTS

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Water repellent coating to exterior concrete masonry surfaces.

1.2. SUBMITTALS

- 1.2.1.** Submit product data under provisions of Section 01 33 00.
- 1.2.2.** Include details of product description, tests performed, limitations to coating, cautionary procedures required during application, and chemical properties, including percentage of solids.
- 1.2.3.** Submit manufacturer's installation instructions under provisions of Section 01 33 00.

1.3. MOCKUP

- 1.3.1.** Provide 10'x10' mockup of installation. Mockup shall include surface preparation, sealant joint and juncture details. Conduct RILEM test before and after each field sample has cured three days. Adjust application until required repellent performance is achieved. Coordinate mockup location with Owner. Mockup must be approved by Owner prior to installation. Mockup may become part of work upon final acceptance.

1.4. QUALITY ASSURANCE

- 1.4.1.** Coating Systems Manufacturer: Company specializing in VOC approved water repellent systems with three years minimum experience.
- 1.4.2.** Applicator: Company specializing in application of specified water repellent coating, with 3 years minimum documented experience and approved by manufacturer.

1.5. ENVIRONMENTAL REQUIREMENTS

- 1.5.1.** Do not apply coating when ambient air and surface temperature is lower than 45 degrees F or higher than 100 degrees F.

1.6. WARRANTY

- 1.6.1.** Contractor's Guarantee:
- 1.6.1.1.** Provide Owner with written Guarantee on Contractor's letterhead, and signed by General Contractor and water repellent coating system subcontractor.
- 1.6.1.2.** Provide guarantee for a time period of five years, commencing from the date of final acceptance of the project.
- 1.6.1.3.** Make inspections and emergency repairs to defects or leaks in the water repellent system within twenty-four (24) hours of receipt of notice from the Owner.

1.6.1.4. Restore the affected areas to the standard of the original specifications as soon as weather permits.

1.6.2. Manufacturers Guarantee:

1.6.2.1. Provide Owner with manufacturers written guarantee complying with the following criteria:

1.6.2.1.1. Type: Unlimited dollar amount of recovery for material necessary to maintain surfaces system in a watertight condition.

1.6.2.1.2. Term: Five (5) years minimum.

2. PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. WATER REPELLENT COATING – CONCRETE MASONRY

2.2.1. Manufacturer: OKON, Inc. www.okoninc.com, or equal.

2.2.2. Series: OKON Plugger.

2.2.3. Characteristics:

2.2.3.1. Composition: Blended Silane/siloxane in VOC compliant water based system.

2.2.3.2. Water Repellency: 90% minimum per ASTM E514.

2.2.3.3. Accelerated Weathering: No Change.

2.2.4. Finish/Color: No sheen or change in substrate.

2.3. OTHER MATERIALS

2.3.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection:

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

- 3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
- 3.1.1.3. In the event of discrepancy, immediately notify the Architect.
- 3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

- 3.2.1. Remove loose particles and foreign matter.
- 3.2.2. Remove oil or foreign substance with a chemical solvent which will not affect coating.
- 3.2.3. Scrub and rinse surfaces with water and let dry.
- 3.2.4. Protect adjacent surfaces not scheduled to receive coating.
- 3.2.5. If applied on unscheduled surfaces, remove immediately, by approved method.

3.3. APPLICATION

- 3.3.1. Allow masonry mortar joints to cure a minimum of 20 days prior to coating application.
- 3.3.2. Apply coating in accordance with manufacturer's instructions, as modified for each substrate and site conditions.
- 3.3.3. Apply number of coats necessary to achieve water repellent characteristics.

END OF SECTION

SECTION 07 21 00

THERMAL AND ACOUSTICAL INSULATION

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Batt acoustical insulation for interior wall and ceiling construction.
- 1.1.2.** Batt thermal insulation for exterior wall and ceiling construction.
- 1.1.3.** Semi - rigid board acoustical insulation above interior partitions.

1.2. REFERENCES

- 1.2.1.** ASTM C 177 - Standard Test Method For Steady-State Heat Flux Measurements And Thermal Transmission Properties By Means Of The Guarded-Hot-Plate Apparatus
- 1.2.2.** ASTM C 518 - Standard Test Method For Steady-State Thermal Transmission Properties By Means Of The Heat Flow Meter Apparatus
- 1.2.3.** ASTM C 578 - Standard Specification For Rigid, Cellular Polystyrene Thermal Insulation
- 1.2.4.** ASTM C 612 - Standard Specification For Mineral Fiber Block And Board Thermal Insulation.
- 1.2.5.** ASTM C 665 - Standard Specification For Mineral-Fiber Blanket Thermal Insulation For Light Frame Construction And Manufactured Housing.
- 1.2.6.** ASTM E 84 - Standard Test Method For Surface Burning Characteristics Of Building Materials

1.3. SUBMITTALS

- 1.3.1.** Materials List:
 - 1.3.1.1.** Submit materials list in accordance with Section 01 33 00.
 - 1.3.1.2.** Prepare complete materials list identifying specific insulation types and applications.
- 1.3.2.** Provide agency approval documentation, including ICBO ES reports, State Fire Marshal Listing, or other approvals.

1.4. DELIVERY, STORAGE, AND HANDLING

- 1.4.1.** Protection:
 - 1.4.1.1.** Deliver, store and handle all products in a manner to prevent damage and deterioration.
 - 1.4.1.2.** Use all means necessary to protect the installed work and materials of all other trades.

- ## 2. PART 2 - PRODUCTS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2.1. Manufacturer: Manville, www.im.com, or equal.

- 2.2.2.** Type: Glass fiber batt, friction fit, unfaced.

2.2.3.1. Blanket: Glass Fiber, Type 1 per ASTM C 665

- 2.2.3.1.1.** Provide formaldehyde free insulation with acrylic binder.

- 2.2.3.1.2.** Provide minimum 25 percent total recycled content, with minimum 18 percent post-consumer recycled content.

- 2.2.3.2.** Facing: None.

- 2.2.3.3. Thickness: 4 inch.**

2.2.4. 2.1.4 Fire/Habitability Criteria:

- 2.2.4.1.** Flame Spread Classification: Maximum 25 per ASTM E 84

- 2.2.4.2.** Smoke Developed Classification: Maximum of 50 per ASTM E 84

- 2.2.4.3.** Thermal Resistance: Minimum R-11 per ASTM C 177 or C 518.

2.3.1. Manufacturer: Manville, www.im.com, or equal.

- 2.3.2.** Type: Glass fiber batt, staple flange, faced.

2.3.3.1. Blanket: Glass Fiber per ASTM C 665.

- 2.3.3.2.** Exposed Facer: Provide reinforced foil facing, with stapling flange, with maximum 25 flame spread classification and maximum 450 smoke contributed classification where facer is not in substantial contact with the unexposed surface of the ceiling finish.

2.3.4. Fire/Habitability Criteria

- 2.3.4.1.** Flame Spread Classification: Maximum 25 per ASTM E 84

- 2.3.4.2.** Smoke Developed Classification: Maximum of 50 per ASTM E 84
- 2.3.4.3.** Thermal Resistance: R-19 value, per ASTM C 177 or C 518.
- 2.3.4.4.** Perm Rating (Foil facer): Maximum 0.02 grains/hr/sf/in Hg per ASTM C 665.

2.4. THERMAL INSULATION: ROOF ASSEMBLY (DRUM ROOM)

- 2.4.1.** Manufacturer: Manville, www.jm.com, or equal.
- 2.4.2.** Type: Glass fiber batt, faced.
- 2.4.3.** Construction:
 - 2.4.3.1.** Blanket: Glass Fiber per ASTM C 665.
 - 2.4.3.1.1.** Provide formaldehyde free insulation with acrylic binder.
 - 2.4.3.1.2.** Provide minimum 25 percent total recycled content, with minimum 18 percent post-consumer recycled content.
 - 2.4.3.2.** Exposed Facer: Provide reinforced foil facing, with stapling flange, with maximum 25 flame spread classification and maximum 450 smoke contributed classification *where facer is not in substantial contact with the unexposed surface of the ceiling finish.*
- 2.4.4.** Fire/Habitability Criteria:
 - 2.4.4.1.** Flame Spread Classification (Batt): Maximum 25 per ASTM E 84
 - 2.4.4.2.** Smoke Developed Classification (Batt): Maximum of 50 per ASTM E 84
 - 2.4.4.3.** Thermal Resistance: R-38 value per ASTM C 177 or C 518.
 - 2.4.4.4.** Perm Rating (Foil facer): Maximum 0.02 grains/hr/sf/in Hg per ASTM C 665.
 - 2.4.4.5.** Perm Rating (Kraft facer): Maximum 1.0 grains/hr/sf/in Hg per ASTM C 665.
- 2.4.5.** Accessory Products:
 - 2.4.5.1.** Wire Lacing: 18 gage prestretched steel wire, with approved anchor system.
 - 2.4.5.2.** Insulation Tape: As recommended by manufacturer, maximum flame spread value of 25.

2.5. INSULATION STICK PINS

- 2.5.1.** Provide Midwest or equal stick pin type insulation hangers of proper length to accommodate insulation thickness, with 2 inch diameter insulation washers with dome cap finish
- 2.6.** Adhesive: Provide manufacturers recommended epoxy adhesive. Self adhesive pins are not acceptable.

2.7. SEMI-RIGID BOARD INSULATION ASSEMBLY (WALL ABOVE CEILING)

- 2.7.1.** Acceptable Manufacturer: USG.

2.7.2. Type: Mineral fiber insulation material.

2.7.3. Product Characteristics: Insulation.

Series: USG Thermafiber Firespan 90 Curtainwall Wall Insulation.

2.7.3.1. Type: Mineral fiber insulation.

2.7.3.2. Thickness: 4 inch.

2.7.3.3. Density: Nominal 8.0 PCF.

2.7.3.4. Facing: FSP Foil facing.

2.7.4. Fire/Habitability Criteria:

2.7.4.1. Flame Spread Classification: Maximum 25 per ASTM E 84.

Smoke Developed Classification: Maximum of 5 per ASTM E 84.

2.8. RIGID BOARD (UNDERSLAB INSULATION)

2.8.1. Acceptable Manufacturer: Dow, or equal; www.building.dow.com/

2.8.2. Type: High Density extruded polystyrene, per ASTM C 578, Type IV.

2.8.3. Product Characteristics:

2.8.3.1. Series: Dow Styrofoam Freezermate Extruded Polystyrene Foam Insulation.

2.8.3.2. Thickness: 3 inch.

2.8.3.3. Compressive Strength: 30 psi at 10 percent deformation.

2.8.3.4. R value: 5.0 per inch at 75 degrees F per ASTM C 518.

2.8.4. Fire/Habitability Criteria:

2.8.4.1. Flame Spread Classification: Maximum 15 per ASTM E 84.

2.8.4.2. Smoke Developed Classification: Maximum of 165 per ASTM E 84.

2.9. OTHER MATERIALS

2.9.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection:

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

- 3.1.1.2.** Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
- 3.1.1.3.** In the event of discrepancy, immediately notify the Architect.
- 3.1.1.4.** Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

- 3.2.1.** Install insulation in accordance with insulation manufacturer's instructions and as specified.
 - 3.2.1.1.** Install faced insulation with facing to occupied room side. Install non-rated facing in contact with unexposed surface of finish materials.
- 3.2.2.** Do not install insulation over recessed light fixtures.
- 3.2.3.** Trim insulation neatly to fit spaces. Fit insulation into crevices, spaces at outlet boxes and similar penetrations.
- 3.2.4.** Maintain continuous foil faced vapor barrier. Provide fire resistive tape at all edges or penetrations of foil faced insulation, including batt ends.
- 3.2.5.** Where wall insulation cavity exceeds 8 feet high, provide blocking or other approved support at 8 feet on center.
- 3.2.6.** Wire Lacing Support Method:
 - 3.2.6.1.** Provide wire lacing method at roof insulation where spacing of framing members exceeds batt width.
 - 3.2.6.2.** Provide wire lacing diagonally at bottom of joist cavity, fastened 16 inches on center, staggered, and fastened to each joist in an approved manner.
 - 3.2.6.3.** Adjust lacing as necessary to provide taut and consistent support for insulation batts.
 - 3.2.6.4.** Install insulation on lacing supports. Provide additional wire lacing at unsupported ends of batts.
 - 3.2.6.5.** Tape all batt ends and penetrations.
- 3.2.7.** Stick Pin Application:
 - 3.2.7.1.** Install insulation in accordance with insulation manufacturer's instructions and as specified.
 - 3.2.7.2.** Space stick pins at 12 inches on center each way with approved adhesive.
 - 3.2.7.3.** Install curtain wall insulation over stick pins. Cover all areas. Install with foil facing to occupied room side. Install washer at all clips.
- 3.2.8.** Tape all insulation batt joints with specified foil backed tape.

END OF SECTION

SECTION 07 52 11

MODIFIED BITUMEN MEMBRANE / INSULATION ROOFING – HOT APPLICATION

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1. Modified bitumen built-up roofing, with base flashings, hot asphalt bitumen application, over insulation substrate.
- 1.1.2. Cap sheet surfacing, with cool roof coating.
- 1.1.3. Rigid Roof Deck Insulation, installed over metal deck substrate.
- 1.1.4. Traffic pads.

1.2. REFERENCES

- 1.2.1. *ASTM D 41 - Concrete Primer Used in Roofing, Dampproofing, and Waterproofing.*
- 1.2.2. *ASTM D 312 - Asphalt Used in Roofing.*
- 1.2.3. Part 2, Title 24, California Code of Regulations, including Chapter 15.
- 1.2.4. NRCA - Roofing and Waterproofing Manual.
- 1.2.5. FMG - Roof Assembly Classifications.
- 1.2.6. UL - Roofing Materials and Systems Directory.
- 1.2.7. UL - Fire Resistance Directory.

1.3. SYSTEM DESCRIPTION

- 1.3.1. Built-up Roofing System: Johns Manville system designation 3CID – CA (modified), hot asphalt bitumen applied roofing system, with mineral surface factory-in-line applied “cool roof” finish.
- 1.3.2. Roofing System Wind Design: Provide system successfully tested by a qualified testing and inspecting agency, including FMG or UL, to resist uplift pressure calculated according to ASCE 7.

1.4. SUBMITTALS

1.4.1. Product Data

- 1.4.1.1. Submit product data under provisions of Section 01 33 00.
- 1.4.1.2. Submit product data indicating membrane and bitumen materials, base flashing materials, and accessories.
- 1.4.1.3. Provide total system breakdown, by layer, in weight and composition.

- 1.4.1.4.** Provide letter of certification, signed by roofing manufacturer, that all products used in completed roof assembly are asbestos free.
- 1.4.1.5.** Submit manufacturer's installation instructions.
- 1.4.1.6.** Submit engineering test data acceptable to Architect demonstrating compliance with wind resistance criteria. Provide California registered engineers stamp and seal if required by Authority Having Jurisdiction.
- 1.4.1.7.** Submit manufacturer's certificate that products are physically and chemically compatible with each other and meet listed ASTM or Federal Specifications.
- 1.4.1.8.** Submit manufacturer's certificate that products comply with current safety and environmental regulations, including hazardous materials labeling and air quality/VOC regulations
- 1.4.2.** Warranties: Provide manufacturers Guaranty form complying with criteria specified in this Section.
- 1.4.3.** Certifications:
 - 1.4.3.1.** Installers Certification: Submit written certification from manufacturer that installer is approved to install No Dollar Limit Guarantee Systems.
 - 1.4.3.2.** Manufacturers Certification: Submit written certification from manufacturer that roof deck and details comply with manufacturers recommendations and are suitable for application, climate zone, slope and code constraints.
- 1.4.4.** Samples:
 - 1.4.4.1.** Submit two 8 inch x 12 inch factory samples of sheet roofing materials.
 - 1.4.4.2.** Submit 24 inch square sample of completed assembly, showing plies, bitumen layers, and surfacing.

1.5. QUALITY ASSURANCE

- 1.5.1.** Company specializing in manufacturing the products specified in this Section with minimum 10 years experience in materials of like design and application.
- 1.5.2.** Installer:
 - 1.5.2.1.** Installer: Company specializing in applying specified roofing system with minimum 5 years documented experience.
 - 1.5.2.2.** Installer: Company approved by materials manufacturer for No Dollar Limit Guarantee work.
 - 1.5.2.3.** Installing Foreman: Individual specializing in applying specified roofing system with minimum 10 years documented experience.

1.5.3. Roof Inspection and Quality Assurance Procedures:

- 1.5.3.1.** Owner may elect to have the entire roofing system application reviewed during application by an inspection service knowledgeable regarding the application of this type of roofing system, and make written report to Architect of all variance from Specifications and established roofing practices as outlined in referenced standards.

1.6. REGULATORY REQUIREMENTS

- 1.6.1.** Fire Hazard Classification: Provide UL Class A systems.

- 1.6.2.** Provide materials clearly marked with UL labels, ASTM standards and hazardous materials designations.

- 1.6.3.** Comply with all safety and regulations and manufacturers recommendations, including those associated with hot adhesive product systems.

- 1.6.4.** Wind Resistance:

- 1.6.4.1.** Provide roof system in compliance with methods defined by Section 1609 and 1504, IBC for wind speed as shown on structural drawings with minimum basic wind speeds of 90 MPH.

1.7. PRE-INSTALLATION CONFERENCE

- 1.7.1.** Convene a pre-installation conference one week prior to commencing work of this Section. Provide minimum 2 weeks advance notice to Owner and Architect of scheduled date. Comply with provisions of Section 01 31 13. Attendance by material manufacturer's representative is mandatory.

- 1.7.2.** Review installation procedures and coordination required with related work.

1.8. DELIVERY, STORAGE, AND HANDLING

- 1.8.1.** Deliver products to site under provisions of Section 01 60 00.

- 1.8.2.** Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.

- 1.8.3.** Store and protect products under provisions of Section 01 60 00.

- 1.8.4.** Store products in weather protected environment, clear of ground and moisture. Cover with manufacturers recommended canvas or cloth covers.

- 1.8.5.** Protect uncoated neoprene and foam insulation products from direct sunlight exposure.

- 1.8.6.** Stand roll materials on end.

1.9. ENVIRONMENTAL REQUIREMENTS

- 1.9.1.** Do not apply roofing membrane during inclement weather, or when rain is anticipated during work period.

- 1.9.2.** Do not apply roofing membrane to damp, wet or frozen deck surface, including dew/condensate.

- 1.9.3.** Do not apply roofing membrane components designated to remain above freezing when ambient temperature is below 40 degrees F, or anticipated to fall below 40 degrees F during work period.
- 1.9.4.** Maintain all roll products above 40 degrees F for 24 hours prior to installation.
- 1.9.5.** Do not install cap sheet products at ambient temperatures below 50 degrees F.

1.10. SEQUENCING AND SCHEDULING

- 1.10.1.** Coordinate work to maintain protection of previously installed work and in accordance with Division 01 provisions.
- 1.10.2.** Coordinate the work of installing associated metal flashings as the work of this Section proceeds.

1.11. GUARANTEE AND WARRANTY

1.11.1. Contractor's Guarantee

- 1.11.1.1.** Provide Owner with written Guarantee on Contractor's letterhead, and signed by General Contractor and roofing system installer.
- 1.11.1.2.** Provide guarantee for a time period of five years, commencing from the date of final acceptance of the project, against the following defects:
 - 1.11.1.2.1.** Water penetration through membrane assembly, including flashings, resulting from improper installation or material defects.
 - 1.11.1.2.2.** Blisters, splits, fishmouths or inter-ply delamination.
- 1.11.1.3.** Make inspections and emergency repairs to defects or leaks in the roof system within twenty-four (24) hours of receipt of notice from the Owner.
- 1.11.1.4.** Restore the affected areas to the standard of the original specifications as soon as weather permits.

1.11.2. Manufacturers Guarantee:

- 1.11.2.1.** Provide Owner with roofing system manufacturers written guarantee complying with the following criteria:
 - 1.11.2.1.1.** Type: Unlimited dollar amount of recovery for labor and material necessary to maintain roof system in a watertight condition, equal to Johns Manville Peak Advantage, No Dollar Limit guarantee.
 - 1.11.2.1.2.** Term: Twenty (20) years.
 - 1.11.2.1.3.** Scope: Single-Source guarantee includes roofing membrane, base flashings, liquid applied flashing, roofing membrane accessories, roof insulation, fasteners, walkway products, manufacturer's expansion joints, manufacturer's edge metal products, and other single-source components of roofing system marketed by the manufacturer.

2. PART 2 - PRODUCTS

2.1. BUILT-UP ROOFING SYSTEM

- 2.1.1.** Basis of Design: Characteristics of specific products manufactured by Johns Manville (www.jm.com) are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under the provisions of Section 01 25 00.
- 2.1.2.** System Description: Johns Manville System designation 3CID-CA (modified), three ply (including cap sheet), hot asphalt bitumen applied modified bitumen roofing system, over insulation substrate, with mineral surface "cool roof" finish

2.2. SHEET MATERIALS

2.2.1. MODIFIED BITUMEN COATED BASE PLY SHEET

- 2.2.1.1.** Type: SBS Modified bitumen coated base sheet complying with ASTM D 6163, Type 1, Grade S, glass-fiber-reinforced, SBS-modified asphalt sheet, smooth surfaced.
- 2.2.1.2.** Series: Johns Manville DynaBase.
- 2.2.1.3.** Product Characteristics:

<u>Material Property</u>	<u>Testing Standard</u>	<u>Performance Requirement</u>
Thickness	ASTM D 5147/D 645	0.09 inches
Weight	ASTM D 146	0.60 PSF
Tensile Strength	ASTM D 146	MD 90/CD 70 lbf/in.
Dimensional Stability % Change	ASTM D 5147	MD 0.10/CD 0.10
Tear Resistance	ASTM D 5147	MD 100/CD 90 lbf/in.
Pliability @ 77 F	ASTM D 146	Pass
Low Temperature Flexibility		ASTM D 146 -35 degrees F
Asbestos Content	EPA 600/M4-82-020	0%
Elongation % Change	ASTM D 5147	MD 4.0/CD 4.0

2.2.2. MINERAL SURFACED COOL ROOF CAP SHEET

- 2.2.2.1.** Type: SBS Modified bitumen coated cap sheet, complying with ASTM D 6162, Grade G, Type II, composite polyester- and glass-fiber-reinforced, SBS-modified asphalt sheet; granular surfaced with factory cool roof coating.
- 2.2.2.2.** Series: JM DynaKap FR CR.

2.2.2.3. Product Characteristics:

<u>Material Property</u>	<u>Testing Standard</u>	<u>Performance Requirement</u>
Thickness	ASTM D 5147/D 645	0.160 inches
Weight	ASTM D 146	1.13 PSF
Tensile Strength	ASTM D 146	MD 150/CD 125 lbf/in.
Dimensional Stability % Change	ASTM D 5147	MD 0.20/CD 0.20
Tear Resistance	ASTM D 5147	MD 150/ CD 125 lbf/in.
Low Temperature Flexibility		ASTM D 146 -10 degrees F
Asbestos Content	EPA 600/M4-82-020	0%
Elongation % Change	ASTM D 5147	MD 4.0/CD 4.0
Fire Resistance	Underwriter Labs	Class A Listed without additional surfacing
Reflectivity	CRRC Solar Reflectance CRRC Thermal Emittance	0.76 initial 0.85 initial

2.2.3. MODIFIED BITUMEN COATED BASE FLASHING

2.2.3.1. Type: SBS Modified bitumen coated fiberglass and polyester mat reinforced base flashing, with mineral surfacing complying with ASTM D 6221, Grade G, Type I, composite polyester- and glass-fiber-reinforced.

2.2.3.2. Series: Johns Manville DynaFlex CR.

2.3. BITUMINOUS MATERIALS AND ACCESSORIES

2.3.1. Owens Corning Trumball, www.owenscorning.com, or equal, low odor asphalt bitumen, complying with the following characteristics:

2.3.1.1. Series: Trulo Max, complying with ASTM D 312, Type IV.

<u>Material Property</u>	<u>Testing Standard</u>	<u>Performance Requirement</u>
EVT		450 degrees @ 125 CPS +/- 25 degrees F
Softening Point	ASTM D 36	210 min-225 max
Flash Point	ASTM D 92	525 degrees F min
Penetration, Units	ASTM D 5	13-22 at 77 degrees F
Ductility	ASTM D 113	2.0 cm min at 77 degrees F
Solubility in Trichloroethylene	ASTM D 2042	99.8 percent

2.4. SINGLE PLY EPDM MEMBRANE

2.4.1. Manufacturer: JM or equal

2.4.1.1. JM 60 FR for flashing applications as indicated in drawings.

2.5. RIGID BOARD INSULATION ASSEMBLY

2.5.1. Manufacturer: JM or equal.

2.5.2. Assembly: Multiple layer insulation assembly

2.5.2.1. Base: polyisocyanurate Board Insulation complying with ASTM C 1289, Type II.

2.5.2.2. Top Cover Board: Perlite insulation complying with ASTM C 728,

2.5.3. Series:

2.5.3.1. Base: JM E'nerg'y 3, homogeneous closed cell polyisocyanurate foam core with fiberglass reinforced facers on both sides.

2.5.3.2. Top Cover Board: JM [Fesco Board](#), 3/4 inch thick, seal coated.

2.5.4. Polyisocyanurate Insulation Characteristics:

2.5.4.1. Thickness: Approximate 5.0 inches total thickness, composed of layers achieving specified thermal insulation value. Maximum 1-1/2 inch thickness of any one layer of insulation.

2.5.4.2. Compression Resistance: 20 psi per ASTM D 1621 at 10 percent consolidation.

2.5.4.3. Thermal Value: Provide minimum R-30 total LTTR assembly value .

2.5.4.4. Fire Rating: UL Listed and Classified as a part of a Class A listed Roof Assembly.

2.5.5. Accessory Insulation Products:

2.5.5.1. Insulation Fasteners: Provide fastener as required to comply with roof uplift listing, corrosion resistant fluorocarbon finish complying with FMG 4470, length as recommended by manufacturer to penetrate metal deck, with approved backer plate.

2.5.5.2. Cold Fluid-Applied Adhesive: Manufacturer's No VOC, two-component cold fluid-applied adhesive formulated to adhere roof insulation to substrate.

2.5.5.3. Urethane Adhesive: Manufacturer's approved urethane adhesive formulated to adhere insulation to substrate.

2.6. THERMAL BARRIER SUBSTRATE BOARD

2.6.1. Manufacturer: JM or equal.

2.6.2. Type: Glass-mat, water-resistant gypsum substrrigTOate complying with ASTM C 1177

2.6.2.1. Thickness: 1/4 inch thick.

2.6.3. Fasteners: Provide fastener as required to comply with roof uplift listing, corrosion resistant fluorocarbon finish complying with FMG 4470, length as recommended by manufacturer to penetrate metal deck, with approved backer plate.

2.7. ADHESIVE MATERIALS AND ACCESSORIES

2.7.1. Cold Process Adhesive at Vertical and Flashing Surfaces: JM MBR Two Part Flashing Cement or approved alternate.

2.7.2. Roofing Granules: Ceramic-coated roofing granules matching specified cap sheet, provided by roofing system manufacturer.

2.8. NAILERS AND CANTS

2.8.1. Provide pressure treated Douglas Fir, LP-2 water based treatment method, for all nailers.

2.8.2. Provide FesCant Plus perlite cant, with minimum 3 inch nominal face, preformed to 45 degree angle.

2.8.3. Where required to create roof curb transitions and crickets, provide perlite insulation transitions, shaped as required.

2.9. ROOF FABRICATIONS AND ACCESSORIES

2.9.1. Roof Drain Flashing: Provide minimum 4 pound, 30 inch square, de-silvered lead pan flashing at all roof drains. Lead flashing shall be completely contained within membrane so that no water flows over uncoated lead.

2.9.2. Roof Accessories:

2.9.2.1. Roof Piping Support: Per Section 07 72 00.

2.9.2.2. Plumbing Vent: Per Section 07 72 00.

2.9.2.3. Isolated Pipe/Conduit Penetration Flashing: Per Section 07 72 00.

2.9.2.4. Multiple Pipe/Conduit Penetration Flashing: Per Section 07 72 00.

2.10. FASTENERS AND MISCELLANEOUS ACCESSORIES

2.10.1. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roofing membrane components to substrate, tested by manufacturer for required pullout strength to achieve specified wind resistance, and provided by the roofing system manufacturer.

2.11. SUMMARY OF MATERIALS (Per 100 Square Feet)

2.11.1. Mineral Surfaced Roofing:

2.11.1.1. Dynabase base sheet (2 plies at 53 lbs each) 106 lbs

2.11.1.2. Dynakap FR CR cap sheet 100 lbs

2.11.1.3. Moppings (3 at 23 pounds between plies) 69 lbs.

2.11.1.3.1. Approximate Total: 275 lbs, not including insulation, and thermal barrier.

2.12. OTHER MATERIALS

2.12.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.2.1. Verify that deck is supported and secured.

3.1.1.2.2. Verify that deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drains, valleys or eaves.

3.1.1.2.3. Verify that surface substrate is properly prepared and dry.

3.1.1.2.4. Verify that roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, and blocking and cant strips are in place.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

3.2.1. Verify roof deck is properly prepared, with flush joints

3.2.2. Install wood nailers at perimeter of openings.

- 3.2.3.** Provide approved UL approved fire extinguishers readily accessible at areas of roofing work. Strictly comply with all state, local, and federal fire and safety regulations.
- 3.2.4.** Cover roof drains to prevent debris entry. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.3. DRAINAGE SUBSTRATE REVIEW

- 3.3.1.** Verify crickets and transitions are constructed in compliance with roof deck criteria. Fill all voids, splits and holes.
- 3.3.2.** Verify roof drainage provides minimum 1/4 inch per foot fall at all areas, including cricket valleys.

3.4. PROTECTION

- 3.4.1.** Where traffic must continue over finished roof installation, protect surfaces to the satisfaction of Architect and materials manufacturer.
- 3.4.2.** Do not drop roofing materials on roofing deck.

3.5. THERMAL BARRIER BOARD APPLICATION

- 3.5.1.** Install thermal barrier board in accordance with manufacturer's instructions and as specified.
- 3.5.2.** Install board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt boards together.
- 3.5.3.** Fasten board to top flanges of steel deck according to recommendations in FMG's "Approval Guide" for specified wind uplift criteria.
- 3.5.4.** Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturer's written instructions

3.6. BOARD INSULATION APPLICATION

- 3.6.1.** Install insulation in accordance with manufacturer's instructions and as specified.
- 3.6.2.** Place boards parallel to deck flutes with edges bearing on flutes.
- 3.6.3.** Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall thickness is **1.5 inches** or greater, install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of **6 inches** in each direction.
- 3.6.4.** Lay board insulation in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations in roof. Fill gaps exceeding **1/4 inch** with like material
- 3.6.5.** Where insulation is designated as tapered, install as required to provide continuous smooth drainage flow. Shape all joints to avoid edges and gaps.
- 3.6.6.** Do not apply more insulation that can be covered with membrane in same day.
- 3.6.7.** Protect building surfaces against damage from roofing work.

3.6.8. Mechanical fasten with subsequent Layers Adhered Insulation and Cover Board:

- 3.6.8.1.** Secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type to deck type
- 3.6.8.2.** Utilize fasteners at FMG spacing I-90 spacing as recommended by the roofing manufacturer. Fasten first layer to resist uplift pressure at corners, perimeter, and field of roof.
- 3.6.8.3.** Install subsequent layers in a cold fluid-applied adhesive or alternate approved hot asphalt bitumen.
- 3.6.8.4.** Apply perlite insulation board as final layer.

3.7. MEMBRANE APPLICATION

- 3.7.1.** Install membrane in accordance with the manufacturer's instructions and as specified. Do NOT begin installation unless entire assembly started can be completed in the same day.
 - 3.7.1.1.** At completion of each days work, install water cutoffs in accordance with the manufacturer's instructions. Completely remove cut-offs prior to commencing work on next day.
- 3.7.2.** Apply asphalt in strict compliance with manufacturers criteria for maintaining proper EVT and FBT.
 - 3.7.2.1.** Equiviscous Temperature at Point of Application: Maintain asphalt at minimum 400 degrees F or no more than 25 degrees F from bitumen rating indicated on bitumen container label, whichever is higher.
- 3.7.3.** Where required by manufacturer, install roof membrane components using hot air or torch procedures and equipment, using extreme caution and in compliance with all applicable safety procedures and regulations.
- 3.7.4.** Where roof slope exceeds 1/2 inch per 12 inches, contact the membrane manufacturer for installation instructions regarding ply installation direction and back-nailing.
- 3.7.5.** Apply ply sheets as specified over insulation, mopped with 23 lb/square of bitumen per ply. Do not permit surfacing or debris within ply system.
 - 3.7.5.1.** Unroll roofing membrane sheets and allow them to relax for minimum time period required by manufacturer.
 - 3.7.5.2.** Starting at low edge of roof, install ply sheet. Lap sides 3 inches and ends 6 inches as required to shed water. Coat sheet uniformly with specified bitumen at specified rate.
 - 3.7.5.3.** Apply an extra layer of ply sheet in all valleys and at all drains.
 - 3.7.5.4.** Extend plies up cant strips and terminate 2 to 4 inches above intersection with vertical surfaces.
- 3.7.6.** Apply plies smooth, free from air pockets, wrinkles, fishmouths, lap joints, or tears. Do not allow ply sheet to contact uncoated ply sheet.

3.7.7. Broom in all plies. Do not walk on plies until membrane has achieved initial set.

3.8. FLASHINGS AND ACCESSORIES

3.8.1. Install base flashings in accordance with the manufacturer's instructions, as shown on drawings and as specified.

3.8.2. Coordinate installation of roof drains and flashings.

3.8.3. Masonry/Concrete Parapet walls:

3.8.3.1. Conform to JM DFE-1 or DFE-2, as shown on drawings, and as specified.

3.8.3.2. Prime wall surface with approved primer.

3.8.3.3. Extend base flashing a minimum of 4 inches onto roof membrane.

3.8.4. Roof Drain:

3.8.4.1. Conform to JM DFE-11, as shown on drawings and as specified.

3.8.4.2. Prime lead flashing surface with approved primer.

3.8.4.3. Install roof membrane system over flashing, including cap sheet, and extend into clamping ring.

3.8.4.4. Install base flashing from clamping ring, and extend minimum 8 inches onto roof membrane.

3.8.5. Roof Penetrations - Conduit and Pipe:

3.8.5.1. Install flashing components as shown on drawings and as specified in this Section and Section 07 72 00.

3.8.5.2. Prime flanges of metal and install one ply of specified cap sheet set in flashing cement. Extend flashing from penetration onto roof a minimum of 12 inches.

3.8.6. Plumbing Vent:

3.8.6.1. Conform to JM DFE-9 and as specified.

3.8.6.2. Install lead flashing over membrane.

3.8.6.3. Prime metal flashing surface with approved primer.

3.8.6.4. Install base flashing from clamping ring, and extend minimum 12 inches onto roof membrane.

3.9. CAP SHEET INSTALLATION

3.9.1. Install cap sheet in accordance with manufacturers recommendations. Allow sheet to relax and install in "Mop and Flop" technique.

3.9.2. Embed in approximately 23 pounds per square of approved bitumen.

3.9.3. Coat all exposed bitumen at cap sheet or flashing with specified granules.

3.10. TRAFFIC PADS (WHERE SHOWN)

3.10.1. Install traffic pads set in mastic in locations indicated on the Drawings.

3.10.2. Cut into 2 x 3 foot sizes and space 3-4 inches apart.

3.11. FIELD QUALITY CONTROL

3.11.1. Correct identified defects or irregularities.

3.11.2. Remove all fishmouths and side lap voids. Repair as recommended by manufacturer.

3.11.3. Remove all plies exhibiting lack of complete bond.

3.12. MANUFACTURER'S FIELD SERVICES

3.12.1. Provide manufacturer's field services under provisions of Section 01 45 00.

3.12.2. Provide site attendance of roofing and board insulation materials manufacturer during initial installation of the work.

3.13. CLEANING

3.13.1. Remove bituminous markings from finished surfaces.

3.13.2. In areas where finished surfaces are soiled by asphalt or any other source of soiling caused by work of this Section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.

- 3.13.3.** Repair or replace defaced or disfigured finishes caused by work of this Section.

END OF SECTION

SECTION 07 60 00
FLASHING AND SHEET METAL

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Reglets and counter-flashings over bituminous base flashings.
- 1.1.2.** Counter-flashings.
- 1.1.3.** Steel pipe downspouts.

1.2. REFERENCES

- 1.2.1.** ANSI/ASTM B 32 - Solder Metal.
- 1.2.2.** ASTM A 53 - Pipe, Steel, Black and Hot Dipped, Zinc-Coated Welded and Seamless.
- 1.2.3.** ASTM B 370 - Copper Sheet and Strip for Building Construction
- 1.2.4.** ASTM A 653 - Steel Sheet, Zinc Coated, (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process..
- 1.2.5.** ASTM A 924 - General Requirements for Steel Sheet, Zinc Coated by the Hot Dip Process.
- 1.2.6.** ASTM D 4586 - Asphalt Roof Cement, Asbestos-Free.
- 1.2.7.** FS O-F-506 - Flux, Soldering, Paste and Liquid.
- 1.2.8.** FS QQ-Z-100 - Zinc Alloy.
- 1.2.9.** NRCA (National Roofing Contractors Association)-Roofing Manual.
- 1.2.10.** SMACNA - Architectural Sheet Metal Manual, 1993 edition.

1.3. SUBMITTALS

- 1.3.1.** Submit shop drawings and product data under provisions of Section 01 33 00.
- 1.3.2.** Describe material profile, jointing pattern, jointing details, fastening methods, and installation details.
- 1.3.3.** Submit manufacturer's installation instructions under provisions of Section 01 33 00.

1.4. QUALITY ASSURANCE

- 1.4.1.** Fabricator: Company specializing in sheet metal flashing work with 5 years minimum experience.

1.5. DELIVERY, STORAGE, AND HANDLING

- 1.5.1.** Store products under provisions of Section 01 60 00.

- 1.5.2.** Stack preformed and prefinished material to prevent twisting, bending, or abrasion, and to provide ventilation.
- 1.5.3.** Prevent contact with materials during storage which may cause discoloration, staining, or damage.

1.6. GUARANTEE

1.6.1. Contractor's Guarantee:

- 1.6.1.1.** Provide Owner with written Guarantee on Contractor's letterhead, and signed by General Contractor and flashing system subcontractor.
- 1.6.1.2.** Provide guarantee against the following defects for a time period of three years, commencing from the date of final acceptance of the project.
 - 1.6.1.2.1.** Flashing blow-off or permanent deformation from wind.
 - 1.6.1.2.2.** Water intrusion through flashing joints into building interior.
- 1.6.1.3.** Make inspections and emergency repairs to defects or leaks in the roof system within twenty-four (24) hours of receipt of notice from the Owner.
- 1.6.1.4.** Restore the affected areas to the standard of the original specifications as soon as weather permits.

2. PART 2 - PRODUCTS

2.1. SHEET MATERIALS

2.1.1. Galvanized Steel:

- 2.1.1.1.** Classification: Per ASTM A 653 and A 924.
- 2.1.1.2.** Finish: Hot Dip galvanized, G90 coating. Provide Paint-Grip finish over galvanizing at all painted flashings.
- 2.1.1.3.** Gage: As specified and shown on drawings. If not shown on drawings, provide minimum 24ga.
- 2.1.1.4.** Downspouts: Steel pipe, ASTM A 53, Grade B, Schedule 40, galvanized, unless otherwise shown or specified.

2.2. ACCESSORIES

- 2.2.1.** Fasteners: Galvanized steel with soft neoprene washers at exposed fasteners. Finish exposed fasteners same as flashing metal.
- 2.2.2.** Sealant: Type specified in Section 07 90 00.
- 2.2.3.** Flashing Cement: As specified in Section 07 52 10.
- 2.2.4.** Solder: ANSI/ASTM B 32; type with less than 0.2% lead.
- 2.2.5.** Flux: FS O-F-506.
- 2.2.6.** Provide water resistant underlayment per Section 09 20 00.

2.2.7. Provide elastomeric flashing per Section 07 13 00.

2.3. PREFABRICATED COMPONENTS

2.3.1. Prefabricated Reglet Assembly:

2.3.1.1. Manufacturer and Series: Fry, www.fryreglet.com , or equal, Type as required for condition shown on drawings.

2.3.1.1.1. For purpose of establishing required level of quality, characteristics of products manufactured by Fry are specified.

2.3.1.2. Counter-Flashing: Galvanized Steel, with windlocks at 32 inches on center and at each corner. Provide prefinished counter-flashing where adjacent to prefinished metal roofing or siding

2.3.1.3. Corners: Provide factory prefabricated corner assemblies.

2.4. FABRICATION

2.4.1. Provide sheet metal work as shown on Drawings and not specified under other Sections. Fabricate as indicated. Where specific details are not shown, fabricate according to applicable SMACNA "Architectural Sheet Metal Manual" criteria.

2.4.2. Form sections true to shape, accurate in size, square, and free from distortion or defects. Match profiles at connections. Provide ribs, cleats, and reinforcement necessary to make sections rigid and substantial. Allow for expansion and contraction.

2.4.3. Unless noted otherwise, fabricate cleats and starter strips of same material as sheet, minimum 2 inches wide, interlocked with fabrication.

2.4.4. Form pieces in longest practical lengths. Locate joints of fascias, roof edges, and other sheet metal work exposed to view with respect to panel joints or other architectural features as indicated on Drawings, or as directed by Architect.

2.4.5. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip and cleat interlock.

2.4.6. Generally, provide shop joints single locked and soldered, or lapped, riveted and soldered. Provide field joints designed to permit expansion, with joint covers or lapped joints with "S" clips. Do not solder.

2.4.6.1. Provide all concealed stiffeners and bracing at roof edge trim, fascia and gutter cover as required by Architect.

2.4.6.2. Provide gutter flashing in compliance with SMACNA Chapter 1, including "rectangular Gutter Design criteria" page 1.8, 5th edition. Provide fully welded two, three and four way gutter intersections, with expansion joints fabricated and located per Figure 1-5 and 1-6.

2.4.7. Form material with flat lock seams unless noted otherwise. Overlap seams in direction of flow with finished width of lock seams and soldered lap seams not less than 1 inches, and finished width of unsoldered lap seams not less than 3 inches.

- 2.4.8.** Where specified, solder and seal metal joints. After soldering, remove flux. Wipe and wash solder joints clean. Provide smooth even surface on exposed soldering on finished surfaces.
- 2.4.9.** Provide shop formed transition and corner pieces with locked and soldered corners. Locate field joints not less than one foot nor more than three feet from actual corner. Shortest length dimension of any corner piece leg shall not be less than one foot.
- 2.4.10.** Fabricate flashing assemblies as specified in this Section and as shown on Drawings.

2.5. FINISH

- 2.5.1.** Paint flashing applications as specified below in off-site shop location.

2.6. OTHER MATERIALS

- 2.6.1.** Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection:

- 3.1.1.1.** Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
- 3.1.1.2.** Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 - 3.1.1.2.1.** Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets in place, and nailing strips located.
 - 3.1.1.2.2.** Verify roof membrane, elastomeric flashing, waterproof underlayment and base flashings are in place, sealed, and secure.
- 3.1.1.3.** In the event of discrepancy, immediately notify the Architect.
- 3.1.1.4.** Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

- 3.2.1.** Field measure site conditions prior to fabricating work.
- 3.2.2.** Install starter and edge strips, and cleats before starting installation.
- 3.2.3.** Except at prefinished material specified in Section 07 41 13, pre-paint all copings, gutters, expansion joint flashings, counter-flashings and related flashing assemblies when visible from any location in final project. Pre-paint in off-site shop location, complying with paint system specified in Section 09 91 00. Touch up after installation.

3.3. INSTALLATION

- 3.3.1.** Support all flashings with firm and stable attachments, anchored into solid backing as required.
- 3.3.2.** Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- 3.3.3.** Where required by installation, solder metal joints watertight for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.
- 3.3.4.** Secure flashings in place using concealed fasteners. Use exposed fasteners only in locations approved by Architect.
- 3.3.4.1.** Insert flashings into reglets to form tight fit. Secure in place in accordance with the manufacturer's instructions.
- 3.3.5.** Gutter, Scupper, And Downspout Installation:
 - 3.3.5.1.** Coordinate with waterproof membrane underlayment installation as specified in Section 07 13 00.
 - 3.3.5.2.** Connect downspouts to downspout boots and seal connection.
- 3.3.6.** Roof Membrane Flashing:
 - 3.3.6.1.** Provide and install in coordination with roofing work, all flashing, counter-flashing, sleeves, and related components as required to provide a watertight installation.
 - 3.3.6.2.** Set sheet metal installed on or adjoining roofing in continuous bed of approved roofing cement.

3.3.6.3. FABRICATION SCHEDULE

- 3.3.7.** Prefabricated and Fabricated Reglet Counterflashing:
 - 3.3.7.1.** Material and Gage: Galvanized steel, 22 gage, painted.
 - 3.3.7.2.** Finish: As specified in this Section, painted, including factory prefinished where adjacent to material specified in Section 07 41 13.
- 3.3.8.** Miscellaneous flashing, roof flashing, metal flashing assemblies and counterflashing:
 - 3.3.8.1.** Material and Gage: Galvanized Steel:
 - 3.3.8.1.1.** Flashing with an exposed vertical face of 8" or less: 24 gage.
 - 3.3.8.1.2.** Flashing with an exposed vertical face of 8" to 10": 22 gage.
 - 3.3.8.1.3.** Flashing with an exposed vertical face of 10" to 15": 20 gage.
 - 3.3.8.2.** Finish: As specified in this Section, painted, including factory prefinished where adjacent to material specified in Section 07 41 13.

3.3.9. Through-Parapet Overflow Scuppers:

3.3.9.1. Material and Gage: Galvanized steel, 22 gage.

3.3.9.2. Finish: Painted.

3.3.9.3. SMACNA Reference: Figure 1-30, with minimum 4 inch flashing flange beneath parapet wall finish.

3.3.10. Conductor Heads:

3.3.10.1. Material and Gage: Galvanized steel, 22 gage.

3.3.10.2. Finish: Painted.

3.3.10.3. SMACNA Reference: Figure 1-25C .

3.3.11. Steel Pipe Downspout:

3.3.11.1. Material and Gage: ASTM A 53, Grade B, Schedule 40, galvanized, unless otherwise shown or specified.

3.3.11.2. Finish: Painted per Section 09 91 00, Painting..

END OF SECTION

SECTION 07 72 00
ROOF ACCESSORIES

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Prefabricated roof penetration flashings.
- 1.1.2.** Prefabricated mechanical equipment support curbs.

1.2. SUBMITTALS

- 1.2.1.** Provide submittals under provisions of Section 01 33 00.
- 1.2.2.** Provide shop drawings of each installation application. Include general construction, configurations, jointing methods and locations when applicable, and fastening methods. Show field based dimensions accommodating existing roof slope and insulation.
- 1.2.3.** Coordinate with type and dimension of equipment, duct and building system piping/conduit component shown on drawings.

2. PART 2 - PRODUCTS

2.1. MANUFACTURERS

- 2.1.1.** Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. ROOF MOUNTED EQUIPMENT/BUILDING SYSTEMS SUPPORTS

- 2.2.1.** Manufacturer: RPS Corporation, www.rpscurbs.com, or
- 2.2.2.** Application: HVAC Duct Penetration Curb:
 - 2.2.2.1.** Series: RC Series with fully welded corners, built-in metal cant.
 - 2.2.2.2.** Height: Minimum 12 inches, fabricated to accommodate roof slope and provide level curb elevation.
 - 2.2.2.3.** Flange: Minimum 3 inches, sized as required to accommodate anchor as shown on drawings.
 - 2.2.2.4.** Gage: 18 gage galvanized shell, base plate, and counter flashing.
- 2.3.** Metal Cover: As specified in Section 07 60 00 and shown on drawings.

2.3. ROOF PENETRATION FLASHING ASSEMBLIES

- 2.3.1.** Manufacturer: S.B.C. Industries or equal (no known equal), phone 1-800-228-2580. www.sbcflashings.com

2.3.1.1. Field fabricated flashing assemblies matching configuration of specified product are approved.

2.3.2. Application: Conduit, Pipe and Plumbing Vent Penetration:

2.3.2.1. Unless otherwise shown on drawings, including mechanical and plumbing documents, provide specified flashing assembly at all penetrations through built up roofing.

2.3.2.2. Type: Stainless steel factory fabricated assembly, presoldered seam at stack to base flashing. Adjust stack to base angle to reflect roof slope. Provide separate counterflashing collar.

2.3.2.3. Series: As recommended by manufacturer, with sealant cover.

2.3.2.4. Size: Fabricate with counterflashing collar minimum 5 inches above roof membrane, and with minimum 3-1/2 inch flashing flange.

2.4. PIPE AND CONDUIT PENETRATION CURBS

2.4.1. Manufacturer: RPS Corporation, www.rpscurbs.com, or equal.

2.4.2. Application: Multiple and Single Pipe/Conduit Penetration:

2.4.2.1. Series: Pipe Portal System, with RC-2A curb complying with specified dimensional criteria. Provide curb length as required for single or multiple pipe penetrations as shown on drawings.

2.4.2.2. Curb Height: Minimum 11 inches, fabricated to accommodate roof slope and provide level curb elevation.

2.4.2.3. Curb Flange: Minimum 3 inches, sized as required to accommodate anchor as shown on drawings.

2.4.2.4. Gage: 18 gage shell, base plate, and counter flashing.

2.4.2.5. Cover: ABS plastic, acrylic coated, with anchor flange.

2.4.2.6. Rubber Cap: EPDM rubber, style as required for number of penetrating items, with stainless steel swivel clamp. Maximum number of penetrations per cap limited to two.

Insulation Fill: Provide fiber glass insulation, 1.5 PCF density, at insulated pipe penetrations, installed as shown on drawings.

2.5. OTHER MATERIALS

2.5.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection:

- 3.1.1.1.** Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
- 3.1.1.2.** Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
- 3.1.1.3.** In the event of discrepancy, immediately notify the Architect.
- 3.1.1.4.** Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. ROOF PENETRATION INSTALLATION

- 3.2.1.** Install in accordance with manufacturer's instructions. Coordinate with installation of roofing system and related flashings. Provide weathertight installation.
- 3.2.2.** Apply bituminous paint on metal surfaces of units in contact with cementitious materials and dissimilar metals.
- 3.2.3.** Pipe And Conduit Penetration Curbs:
 - 3.2.3.1.** Fasten to roof deck with corrosion resistant fasteners, type and size as shown on drawings and as specified.
 - 3.2.3.2.** Anchorage: Provide fasteners at each side of accessory/shell, 6 inches from each end and at 18 inches maximum on center, minimum of 1 per side.
 - 3.2.3.3.** Carefully cut cap, properly selected for penetration diameter. When cut, cap shall fit tight against penetration, fastened with specified adjustable clamp without puckers or gaps.
 - 3.2.3.4.** Where insulated pipe occur, fill cap cavity with specified insulation supported as shown on drawings.
- 3.2.4.** Roof Penetration Flashing Assemblies:
 - 3.2.4.1.** Install roof penetration flashings coordinated with roof membrane installation.
 - 3.2.4.2.** Where required, field solder base to form watertight seam.
- 3.2.5.** Install complete with sealant, neoprene tape, and sealant cover.

END OF SECTION

SECTION 07 90 00
JOINT PROTECTION

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Sealants and joint treatment necessary to provide a positive barrier against passage of moisture and air.
- 1.1.2.** Sealants at material joints necessary to provide closure for ease of cleaning and maintenance.
- 1.1.3.** Sealants at all penetrations of sound rated walls and floors.

1.2. SUBMITTALS

- 1.2.1.** Materials List/Product Data: Submit complete materials list, including catalogue data, of all materials, equipment, and products.
- 1.2.2.** Samples: Accompanying Materials List, submit two (2) samples of each type of specified sealant, including color range available.
- 1.2.3.** Test Data:
 - 1.2.3.1.** Staining: Provide test data, performed on concrete, demonstrating no staining or discoloration of adjacent substrate from sealant or primer.
- 1.2.4.** Certifications: As a condition of acceptance, submit certification stating that sealants and joint treatments are installed per submittal and are complete and ready for intended function.

1.3. QUALITY ASSURANCE

- 1.3.1.** Qualifications: Provide adequate numbers of skilled staff, thoroughly trained and experienced in the necessary craft and installation methods associated with the specified products.

1.4. COORDINATION

- 1.4.1.** Coordination: Sequence all work to assure an orderly progress in the project, without removal of previously installed work, and so as to prevent damage to finishes and products.

1.5. DELIVERY, STORAGE, AND HANDLING

- 1.5.1.** Protection: Use all means necessary to protect work in this Section before, during and after installation and to protect the installed work and materials of all other trades.
- 1.5.2.** Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.
- 1.5.3.** Product Storage: Do not retain on site any material which has exceeded the shelf life recommended by the manufacturer.

1.6. GUARANTEE

1.6.1. Contractor's Guarantee:

- 1.6.1.1.** Provide Owner with written Guarantee per Section 00 65 36 on Contractor's letterhead, and signed by General Contractor and sealant system subcontractor.
- 1.6.1.2.** Provide guarantee for a time period of five years, commencing from the date of final acceptance of the project, against the following defects:
 - 1.6.1.2.1.** Adhesive or cohesive sealant joint failure.
 - 1.6.1.2.2.** Pin holes or blistering of sealant joint.
 - 1.6.1.2.3.** Staining of adjacent substrate or surrounding material.
 - 1.6.1.2.4.** Chalking or color change exceeding manufacturers published data.
- 1.6.1.3.** Make inspections and emergency repairs to defects or leaks in the sealant system within twenty-four (24) hours of receipt of notice from the Owner.
- 1.6.1.4.** Restore the affected areas to the standard of the original specifications as soon as weather permits.

2. PART 2 - PRODUCTS

2.1. MANUFACTURERS

- 2.1.1.** Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. SEALANTS

2.2.1. General:

- 2.2.1.1.** All sealants for any one Type shall be the product of a single manufacturer, suitable for the intended use, and per the following product characteristics.
- 2.2.1.2.** Unless noted otherwise, use sealants in application as defined below.
- 2.2.1.3.** For other applications provide products especially formulated for the proposed use and approved in advance by the Architect.

2.2.2. Product Characteristics:

- 2.2.2.1.** Type 1: Unless noted otherwise, at exterior openings, joints, material transitions, bedding, and other conditions where anticipated joint movement will be plus/minus 25% or less.
 - 2.2.2.1.1.** Products: Dow Corning 795, Pecora 895, Tremco Tremsil 600, or equal.

- 2.2.2.2.** Type 2: At all exposed metal to metal wall and roof flashing conditions, all exposed prefinished metal roofing and flashing conditions; storefront perimeter conditions, and all other conditions where anticipated joint movement will be plus/minus 25 - 50%.
 - 2.2.2.2.1.** Products: Dow Corning 795, GE Silicones Silglaze II, Tremco Spectrum 2, or equal.
- 2.2.2.3.** Type 3: At horizontal concrete paving joints exposed to pedestrian and vehicular traffic, and all joints subject to immersion:
 - 2.2.2.3.1.** Products: Pecora DynaTred, Tremco Vulkem 45SSL, Sonneborn NP2, or equal.
- 2.2.2.4.** Type 5: Pipes and conduits penetrating underground walls:
 - 2.2.2.4.1.** Sealant compatible with waterproofing system.
- 2.2.2.5.** Type 6: Interior applications in conjunction with sanitary conditions (non-food use):
 - 2.2.2.5.1.** Products: General Electric Silicone Sanitary Sealant 1702, Dow Corning 786, Pecora 898 Sanitary Silicone Sealant, or equal.
- 2.2.2.6.** Type 7: Interior sound control applications.
 - 2.2.2.6.1.** Products: USG Sheetrock Acoustical Sealant, Pecora AC-20 FTR, Tremco Acoustical Sealant, or equal.
- 2.2.2.7.** Type 8: Unless noted otherwise, at interior openings, joints, material transitions and bedding, at locations shown on drawings, and other conditions where anticipated joint movement will be 25% or less.
 - 2.2.2.7.1.** Products: Pecora 864, Dow Corning 795, Sonneborn Omniseal, or equal.
- 2.2.2.8.** Type 9: At all concealed prefinished metal roofing and flashing conditions, provide butyl sealant as recommended by metal roofing manufacturer.
- 2.2.2.9.** Type 10: At all metal flashing and gutter joints subject to periodic or continuous water immersion:
 - 2.2.2.9.1.** Products: Dow Corning 799, Pecora 863, or equal.
- 2.2.2.10.** For other applications provide products especially formulated for the proposed use and approved in advance by the Architect.
- 2.2.3.** Colors:
 - 2.2.3.1.** Colors for each sealant application will be selected by the Architect from standard colors normally available from the manufacturers complete line of running line colors, including premium and special color lines for each specified product.

- 2.2.3.2.** Should such standard color not be available from the approved manufacturer except at additional charge, provide such colors at no additional cost to the Owner.
- 2.2.4.** In concealed installations, and in partially or fully exposed installations where approved by the Architect, use standard gray or black sealant.

2.3. ACCESSORIES

- 2.3.1.** Primers: Provide primer as specifically recommended for this installation by the manufacturer of the sealant used and have been tested for staining, adhesion and durability on all applicable surfaces.
- 2.3.2.** Back-Up Materials: Use only those backup materials which are specifically recommended for this installation by the sealant manufacturer, non-absorbent and non-staining.
- 2.3.3.** Masking Tape: For masking around joints, provide an appropriate masking tape which will effectively prevent application of sealant on surfaces not scheduled to receive it, and which is removable without damage to substrate.

2.4. OTHER MATERIALS

- 2.4.1.** Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

- 3.1.1.** Inspection:
 - 3.1.1.1.** Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
 - 3.1.1.2.** Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 - 3.1.1.3.** In the event of discrepancy, immediately notify the Architect.
 - 3.1.1.4.** Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

- 3.2.1.** Concrete and Masonry Surfaces:
 - 3.2.1.1.** Install only on surfaces which are dry, sound, and well brushed, wiping free from dust.
 - 3.2.1.2.** At open joints, remove dust by mechanically blown compressed air if so required.
 - 3.2.1.3.** To remove oil and grease, use sandblasting or wire brushing.

3.2.1.4. Where surfaces have been treated, remove the surface treatment by sandblasting or wire brushing.

3.2.1.5. Remove laitance and mortar from joint cavities.

3.2.2. Steel Surfaces:

3.2.2.1. Unprimed or unfinished steel surfaces in contact with sealant:

3.2.2.2. Sandblast as required to achieve acceptable surface for bond.

3.2.2.3. If sandblasting is not practical, or would damage adjacent finish, scrape the metal or wire brush to remove mill scale and rust.

3.2.2.4. Use solvent to remove oil and grease, wiping the surfaces with clean white rags only.

3.2.2.5. Remove protective coatings on steel by sandblasting or by using a solvent which leaves no residue.

3.3. INSTALLATION OF ACCESSORY MATERIALS

3.3.1. When using backup of tube or rod stock, avoid lengthwise stretching of material. Do not twist or braid hose or rod backup stock.

3.3.2. Prime joints in accordance with manufacturers recommendations.

3.3.3. Provide an approved bond-breaker where recommended by sealant manufacturer.

3.4. INSTALLATION OF SEALANTS

3.4.1. Prior to start of installation in each joint, verify the joint type according to details on the drawings, or as otherwise directed by the Architect, and verify that the required proportion of width of joint to depth of joint has been secured.

3.4.2. Equipment:

3.4.2.1. Apply sealant under pressure with power-actuated hand gun or manually-operated hand gun, or by other appropriate means.

3.4.2.2. Use guns with nozzle of proper size, and providing sufficient pressure to completely fill the joints as designed.

3.4.2.3. Do not use pourable sealant installation method at hardscape paving joints.

3.4.3. Thoroughly and completely mask joints where the appearance of primer or sealant on adjacent surfaces would be objectionable.

3.4.4. Install the sealant in strict accordance with the manufacturer's recommendations, thoroughly filling joints to the recommended depth.

3.4.4.1. Use of sealant dams contained within the hardscape joint is not permitted. Install sealant without interruption from end to end of joint.

3.4.5. Tool joints to the profile shown on the Drawings, or as otherwise required if such profiles are not shown on the Drawings.

3.4.5.1. Tool joints to a smooth and consistent transition. Do not leave ripples, strings, or surface tooling marks in sealant.

3.4.6. Unless otherwise specified, at all sound rated wall and floor assemblies, seal penetrations and recessed items through the floors and walls with Type 7 sealant. Seal all penetrations such as electrical device cover plates, pipes, fire extinguisher cabinets and similar penetrations in room surfaces.

3.5. CLEANING

3.5.1. Remove masking tape immediately after joints have been tooled.

3.5.2. Clean adjacent surfaces free from sealant as the installation progresses, using solvent or cleaning agent recommended by the manufacturer of the sealant used.

3.5.3. Upon completion of the work of this Section, promptly remove from the job site all debris, containers, and surplus material derived from this portion of the Work.

END OF SECTION

SECTION 08 11 00
STEEL DOORS AND FRAMES

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Hollow metal rolled steel doors, non-rated fire resistance.
- 1.1.2.** Hollow metal rolled steel borrowed lite and window frames, non-rated fire resistance.
- 1.1.3.** Modifications to existing doors and frames to accommodate new hardware, including field inspection for labeling of fire rated assemblies.

1.2. REFERENCES

- 1.2.1.** ASTM A 1008 – Specification for Commercial Steel Sheet, Carbon (0.15 Percent), Cold-Rolled.
- 1.2.2.** ASTM A 653 – Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process.
- 1.2.3.** ANSI/SDI-100 - Recommended Specifications for Standard Steel Doors and Frames.
- 1.2.4.** ANSI/SDI-119 - Performance Test Procedures for Steel Door Frames and Anchors.
- 1.2.5.** NFPA-80-95 - Standard for Fire Doors and Fire Windows.
- 1.2.6.** ANSI-A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance, Steel Doors and Frames.
- 1.2.7.** ANSI-A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
- 1.2.8.** ANSI A 250.6 - Hardware on Steel Doors (Reinforcement-Application).Warnock Hersey - Certification Listings for Fire Doors.
- 1.2.9.** Underwriters Laboratories - Building Materials Directory
- 1.2.10.** Refer to Section 13 49 00 for lead lined frames

1.3. SUBMITTALS

- 1.3.1.** Submit shop drawings and product data under provisions of Section 01 33 00.
 - 1.3.1.1.** Provide shop drawings illustrating system and component dimensions, components within assembly, framed opening requirements and tolerances, anchorage and fasteners; glass and infills; and affected related work.
 - 1.3.1.2.** Provide, where required, shown or specified, custom modifications to manufacturers or referenced standard, including material gage, anchorage, dimension and fabrication criteria.
 - 1.3.1.3.** Provide manufacturer's installation instructions and listing requirements.

- 1.3.2.** Samples: Provide one 12 inch square sample of each type of door, cut at corner, showing edge treatment and core material.

1.4. QUALITY ASSURANCE

- 1.4.1.** Certification of Labeled Construction: After notifying Architect of oversize requirements, furnish inspection certificate certifying component construction conforms to UL rating requirements.
- 1.4.2.** Hollow metal supplier shall be a qualified direct distributor of specified products.
- 1.4.2.1.** Distributor shall employ a an A.H.C./C.D.C. or person of equivalent experience who will be available at reasonable times to consult with the architect and owner regarding all matters affecting work of this Section.
- 1.4.3.** Hollow metal supplier shall be a member of the Steel Door Institute or Hollow Metal Manufacturers Association Division of NAAMM.
- 1.4.4.** Perform work in accordance with standards of the Steel Door Institute and as required by this Section.
- 1.4.4.1.** Where more restrictive than referenced standards, comply with requirements of this Section.
- 1.4.5.** Provide written certification all doors conform to Level 'A' criteria of ANSI-A-250.4 , including testing to 2,000,000 operating cycles.
- 1.4.6.** Provide written certification all door frames conform to Level 'A' criteria of ANSI-A-250.5 , including testing to 1,000,000 operating cycles.
- 1.4.7.** Where exterior window wall frames and mullions occur, design for wind load resistance in accordance with Chapter 16.
- 1.4.7.1.** Where required by Architect, provide engineering structural calculations, signed by a licensed Arizona structural engineer, demonstrating member, frame and anchorage complies with loading criteria established by Chapter 16 for specified wind loading. Cost of engineering shall be at no additional cost to the Owner.
- 1.4.7.2.** Provide engineering based on Wind Speed of 90 miles per hour, Exposure C condition.

1.5. REGULATORY REQUIREMENTS

- 1.5.1.** Conform to Chapters 7 and 10 IBC, for fire rated frames and doors.
- 1.5.2.** Construct fire rated door panel and frame construction in conformance with NFPA 252.
- 1.5.3.** Install fire rated frame and door assemblies in conformance with NFPA 80, UL/WH approval listing and manufacturers instructions.

1.6. DELIVERY, STORAGE AND PROTECTION

- 1.6.1.** Deliver doors and frames cardboard wrapped, crated, palletized or otherwise protected during transit and site storage.

1.6.2. Inspect doors and frames upon delivery for damage. Minor damage may be repaired provided refinished items are equal in all respects to new work and accepted by the Architect; otherwise remove and replace damaged items.

1.6.3. Store doors and frames at the building site in a dry secure place.

1.6.3.1. Place units on minimum 4 inch high wood blocking.

1.6.3.2. Store in vented shelters.

1.6.3.3. If cardboard wrapper on door becomes wet, remove carton immediately.

1.6.3.4. Provide 1/4 inch spaces between stacked doors to promote air circulation.

1.7. SEQUENCING AND SCHEDULING

1.7.1. Order and deliver all doors and frames so as not to delay progress of work of other Sections.

2. PART 2 - PRODUCTS

2.1. STEEL DOORS

2.1.1. Manufacturer: Characteristics of specific products manufactured by Security Metal Products Corporation (SMPC), www.secmet.com, are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.1.2. Type/Series:

2.1.2.1. Type: Flush, Hollow metal, with core material as specified.

2.1.2.1.1. Style: As shown on drawings..

2.1.3. Construction:

2.1.3.1. Grade:.08

2.1.3.1.1. Exterior Doors: Grade III per SDI 100.

2.1.3.2. Material: Cold Rolled Steel per ASTM A 653, CS grade, A 60 galvanized, extra smooth.

2.1.3.3. Thickness: 1-3/4 inch.

2.1.3.4. Face Sheet Gauge:

2.1.3.4.1. Exterior Doors: 16 gage.

2.1.3.5. Edge Seams: Continuously welded and ground smooth. Filler not acceptable.

2.1.3.6. Core:

2.1.3.6.1. Exterior Doors: Provide polystyrene core, minimum 1.0 pcf density, R value of 12.5.

2.1.3.6.2. Fire Rated Doors: Provide core as required to comply with rating shown on drawings.

2.1.3.7. Vision Glass Frame: Anemostat Series FGS-75, www.anemostat.com, or equal, factory primed and finish painted per Section 09 91 00. Refer to Section 08 81 00 for glazing.

2.1.4. Finish:

2.1.4.1. At exterior doors, provide Hot Dip Galvanized finish per ASTM A 653, A 60 classification, *extra smooth*.

2.1.4.2. Provide spray applied primer at all interior doors per ANSI A250.10.

2.2. STEEL DOOR AND WINDOW FRAMES

2.2.1. Manufacturer: Characteristics of specific products manufactured by Security Metal Products Corporation (SMPC), www.secmet.com, are indicated to establish required level of quality, appearance, and performance. The Architect will consider comparable products by alternate manufacturers listed in this Section, and requests for substitutions, under the provisions of Section 01 25 00.

2.2.2. Type: Unless noted otherwise, wrap around, double rabbet, flush frames, welded as specified.

2.2.2.1. Where shown on drawings, provide frames for dual egress and cross corridor applications.

2.2.3. Construction:

2.2.3.1. Material: Cold Rolled Steel per ASTM A 653, CS Grade, A 60 galvanized, *extra smooth*.

2.2.3.2. Face Dimension: 2 inches, unless otherwise shown on drawings.

2.2.3.3. Gage:

2.2.3.3.1. Exterior: 16 gage.

2.2.3.3.2. Interior: 16 gage.

2.2.3.4. Gasketing/Weatherseal: As specified in this Section.

2.2.3.5. Glazing: Per Section 08 81 00.

2.2.4. Finish:

2.2.4.1. At exterior frames, provide Hot Dip Galvanized finish per ASTM A 653, A 60 classification, *extra smooth*.

2.2.4.2. Provide spray applied primer at all interior frames per ANSI A224.1.

2.2.4.3. Provide bituminous paint coating at interior surface of grout filled frames.

2.2.5. Anchors:

- 2.2.5.1.** Provide minimum 18 gage head and jamb anchors suitable for wall condition and in configuration for welded in place installation.
- 2.2.5.2.** Provide minimum 16 gage masonry T-Anchors at masonry walls. Wire anchors not acceptable.

2.2.6. Glass Stops:

- 2.2.6.1.** Manufacturer's standard glass stop, minimum 5/8 inch high for glass area under 500 square inches and minimum 3/4 inch high for glass area over 500 square inches.
- 2.2.6.2.** Glass stop shall be attached with countersunk Phillips head screws.

2.3. FABRICATION

2.3.1. General:

- 2.3.1.1.** Fabricate all doors and frames in accordance with SDI 100 except where more stringent requirements are specified.
- 2.3.1.2.** Supply only doors and frames manufactured by a single manufacturer.

2.3.2. Door Construction:

- 2.3.2.1.** Unless otherwise required by hardware specified in other Sections, bevel vertical lock edges 1/8 inch in 2 inches.
- 2.3.2.2.** Door lock edge reinforcing: one-piece, full height 14 gage channel.
- 2.3.2.3.** Closer Reinforcing: one-piece, minimum 12 gage plate.
- 2.3.2.4.** Door Hinge Edge Reinforcing: one-piece, full height 14 gage channel, formed and tapped for hinges, with additional 7 gage reinforcement at each hinge.
- 2.3.2.5.** Weld both hinge and lock channels to each door face sheet.
- 2.3.2.6.** Provide minimum 16 gage top and bottom channels, flush or inverted, and welded to face sheets.
 - 2.3.2.6.1.** Close tops of outswinging exterior doors flush by the addition of steel top channel filler.

2.3.3. Frame Construction:

- 2.3.3.1.** Unless specified otherwise, provide SMPC Type 1A weld joints. Weld all frame intersections with face welds. Weld face trim, tabs and frame soffit with continuous fillet weld. Grind all welds smooth. Repair specified finish.
 - 2.3.3.1.1.** At all exterior openings, provide SMPC Type 2B weld joints. Provide continuous welds at all horizontal to vertical sections, including stop sections and rabbets on exterior side. Weld face trim, tabs, rabbets, and frame soffit with continuous fillet weld.
 - 2.3.3.1.2.** Grind all welds smooth. Repair specified finish

- 2.3.3.2.** Provide temporary shipping bars for protection from damage during transit and handling.
- 2.3.3.3.** Remove temporary spreaders before setting frames.
- 2.3.3.4.** Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.
- 2.3.3.5.** Prepare door frame for silencers. Provide three single rubber silencers for single doors on strike side, and two single silencers on frame head at double doors without mullions.
- 2.3.3.6.** Supply welded in mortar guards at all hardware cutouts in frames built into masonry or grouted.
- 2.3.3.7.** Fabricate window frames for glass thickness as shown on drawings or specified. Provide roll formed integral stop portion of frame on interior side of frame.
- 2.3.3.8.** Provide loose glass stops, located on exterior of exterior window frame. Fasten using Phillips/spanner head screws, located as necessary to assure compression of glass against weatherseal.

2.3.4. Frame Anchors:

2.3.4.1. Wall Anchors for Drywall/Frame Partitions:

- 2.3.4.1.1.** Provide steel or wood stud anchors sized to accommodate frame jamb depth and face dimension on all welded frames.

2.3.4.2. Provide frame jamb anchors at 30 inches on center (or fractional portion) on each jamb.

2.3.4.3. Floor Anchors:

- 2.3.4.3.1.** Where access to back of frame is possible, provide angle clip type, 16 gage minimum, welded to the bottom of each jamb.

2.3.5. Hardware Preparation:

2.3.5.1. Reinforcement: Reinforce components for hardware installation in accord with ANSI A 250.8 and A250.6 and the following criteria.

- 2.3.5.1.1.** Provide 'box' type lock reinforcing, minimum 16 gage.
- 2.3.5.1.2.** Provide minimum 7 gage hinge reinforcing, welded to frame.
- 2.3.5.1.3.** Provide minimum 12 gage closer reinforcement.
- 2.3.5.1.4.** Provide minimum 12 gage reinforcement at other hardware locations.

2.3.5.2. Locate factory prepared hardware locations in compliance with "Recommended Locations for Builders' Hardware for Standard Steel Doors and Frames", as adopted by The Steel Door Institute.

2.3.6. Door and Frame Modifications:

2.3.6.1. Modify existing doors and frames as indicated on Door Schedule with specified hardware.

2.3.6.1.1. Carefully remove and store existing hardware.

2.3.6.1.2. Prior to modifying assembly, review modification with Testing service representative to verify modification will not void rating, or that modification will prevent rating from being assigned in field.

2.3.6.1.3. Prepare frames and doors for new hardware, including reinforcing.

2.3.6.1.4. Provide filler plates or approved metallic filler putty at all recesses and holes left exposed.

2.3.6.1.5. Arrange for testing service field inspection of modification, including continuous inspection where required, and obtain label for assembly as defined on drawings.

2.4. GASKET AND WEATHERSEAL

2.4.1. Type 1: Provide wet seal at exterior window assemblies, using Type 1 sealant per Section 07 90 00 silicone sealant at exterior, and approved glazing tape at interior, color as selected by Architect. Alternate weatherseal methods may be approved by Architect.

2.4.2. Type 2: Provide dry seal installation at Interior window assemblies, using glazing tape, thickness as necessary for installation.

Accessories: Provide neoprene setting blocks, edge blocks and other accessories as necessary for complete installation in accordance with referenced standards.

2.5. OTHER MATERIALS

2.5.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection:

3.1.1.1. Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

- 3.3.2.2.** Meeting edges of doors and mullions: 1/8 inch.
- 3.3.2.3.** Transom panels, without transom bars: 1/8 inch.
- 3.3.2.4.** Sills without thresholds: 5/8 inch maximum above finish floors.
- 3.3.2.5.** Sills with thresholds: 1/8 inch above threshold.

3.4. ADJUSTMENT AND CLEANING

- 3.4.1.** Remove dirt and excess sealants, mortar, or glazing compounds from exposed surfaces.
- 3.4.2.** Adjust moving parts for smooth operation. Use shims if necessary to allow for proper closing.
- 3.4.3.** Where approved by Architect, fill all dents, holes, and similar defects with epoxy metal filler. Where required by Architect, fill all dents, holes and similar defects with weld material. After filling, grind smooth and flush with adjacent surface. Provide approved zinc rich primer at all galvanized products.
- 3.4.4.** Touch up abrasions with primer.

END OF SECTION

SECTION 08 14 00

WOOD DOORS

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.2.** Wood doors, non-rated. REFERENCES
- 1.2.1.** International Building Code (IBC), as adopted by Authority Having Jurisdiction.
- 1.2.1.1.** Underwriters Laboratories, Inc. (UL)
- 1.2.2.** WDMA Industry Standard I.S. 1-A-2004
- 1.2.3.** ANSI A115. W Series, Wood Door Hardware Standards.
- 1.2.4.** FSC – Forest Stewardship Council
- 1.2.5.** SCS – Scientific Certification Systems
- 1.2.6.** Architectural Woodwork Standards (AWS), Architectural Woodwork Institute
- 1.2.7.** Intertek Testing Services-Warnock Hersey (ITS-WH)

1.3. QUALITY ASSURANCE

- 1.3.1.** Conform to requirements of WDMA I.S.1-A, Premium grade.
- 1.3.2.** Doors of all types shall be manufactured by a single source.
- 1.3.3.** Door supplier shall be a qualified direct distributor of specified products.
- 1.3.4.** Distributor shall employ an A.H.C./C.D.C. or person of equivalent experience who will be available at reasonable times to consult with the Architect and Owner regarding all matters affecting work of this Owner.

1.4. SUBMITTALS

- 1.4.1.** Submit under provisions of Section 01 33 00.
- 1.4.2.** Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- 1.4.3.** Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, beveling, blocking for hardware, factory machining criteria, cutouts for openings.
 - 1.4.3.1.** Shop drawings shall bear the WI Certified Compliance Label.
- 1.4.4.** Samples:
 - 1.4.4.1.** Submit one sample of door construction, 12 inch square in size cut from bottom corner of door.

2.2. NON RATED WOOD DOORS

- 2.2.1.** Manufacturer: Marshfield Door Systems, www.marshfelddoors.com, or equal.
- 2.2.2.** Types: Non-rated, flush face, solid core door with vision glass, or louvers.
- 2.2.3.** Door Series/Style: DSP-1.
- 2.2.4.** Construction:
 - 2.2.4.1.** Standard: WDMA I. S. 1-A Premium Series.
 - 2.2.4.2.** Adhesive: AWS Type I, waterproof, formaldehyde free.
 - 2.2.4.4.** Core: Mat formed particle board conforming to ANSI A208.1-LD-2, with no added urea formaldehyde
Visible Edge Bands: Hardwood matching veneer species, without finger joints, minimum 3/4 inch thick over hardwood stiles.
 - 2.2.4.5.** Veneer:
 - 2.2.4.5.1.** *Grade: Grade 1 per AWI 200, Medium Density Overlay.*
 - 2.2.4.5.2.** Grade/Species: White Birch, WDMA Grade 1 (Premium) Grade, Transparent Finish, per WIC section 5.
 - 2.2.4.5.3.** Veneer Thickness: 1/50 inch minimum.
 - 2.2.4.5.4.** Veneer Cut: Plain Sliced per WDMA IS 1-A.
 - 2.2.4.5.5.** Veneer Grain Match: Balance match.
 - 2.2.4.5.6.** Use of rain forest products in veneer, crossbands or backs is not acceptable.
 - 2.2.4.6.** Vision Glass Frame: Anemostat or equal, Series FGS-75, factory primed and finish painted per Section 09900. Refer to Section 08 81 00 for glazing.
- 2.2.5.** Finish:
 - 2.2.5.1.** Finish: Factory prefinish all doors at factory in accordance with WDMA I.S.1A or AWS Quality Standards.
 - 2.2.5.2.** System: Provide water based stain with ultraviolet (UV) cured polyurethane sealer, complying meet or exceed performance standards of UV cured polyurethane (TR-6 per WDMA) or (System 9 per AWS).
 - 2.2.6.** Color/gloss: As selected by Architect from manufacturers standard stain color line.

2.3. FABRICATION

- 2.3.1.** General
 - 2.3.1.1.** Fabricate all doors in accordance with referenced standards unless more stringent requirements are specified.

2.3.1.2. Supply each door type manufactured by a single manufacturer.

2.3.2. Where required by hardware application, provide minimum 5-1/2 inch wide top blocking, minimum 10 inch wide intermediate/lock blocking, and minimum 5-1/2 inch wide bottom blocking for hardware backing and reinforcement.

2.3.3. Coordinate with all finish flooring materials as required to provide proper clearance.

2.3.4. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions and with referenced standards. Do not machine for surface hardware. Provide solid blocking for through bolted hardware.

2.3.5. Factory fit doors for frame opening dimensions identified on shop drawings.

2.3.6. Where specified, cut and configure exterior door edge to receive recessed weather stripping devices.

2.3.7. Provide edge clearances to cut outs and hardware preparation in accordance with listing requirements and specified references.

2.3.7.1. Prepare door and all machining in compliance with NFPA 80.

2.3.8. Coordinate sealing of door edges and door preparation/machining with Section 09 91 00.

2.4. OTHER MATERIALS

2.4.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this Owner, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this Owner may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

3.2.1. Install doors in accordance with AWS Section 9.

3.2.1.1. Do not field trim doors without prior approval.

3.2.1.2. Trim non-rated door width by cutting equally on both jamb edges.

- END OF SECTION**

SECTION 08 62 01
TUBULAR SKYLIGHTS

1. PART 1 – GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Tubular Skylight system, suspended ceiling application.

1.2. REFERENCES

- 1.2.1.** ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2008a.
- 1.2.2.** ASTM A 463/A 463M - Standard Specification for Steel Sheet, Aluminum Coated, by the Hot Dip Process; 2006.
- 1.2.3.** ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc Coated (Galvanized), by the Hot Dip Process; 2007.
- 1.2.4.** ASTM E 283 - Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004.
- 1.2.5.** ASTM E 308 - Standard Practice for Computing the Colors of Objects by Using the CIE System; 2006.
- 1.2.6.** ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls and Doors; 2002.
- 1.2.7.** ASTM E 547 - Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain walls by Cyclic Air Pressure Difference; 2000.
- 1.2.8.** ASTM D 635 - Test Method for Rate of Burning and/or Extent of Time of Burning of Self-Supporting Plastics in a Horizontal Position; 2006.
- 1.2.9.** ASTM D-1929 - Test Method for Ignition Properties of Plastics; 1996 (2001).
- 1.2.10.** UL 790 - Standard for Tests for Fire Resistance of Roof Covering Materials; 2004.
- 1.2.11.** ICBO/ICC AC-16 - Acceptance Criteria for Plastic Skylights; 2008.

1.3. QUALITY ASSURANCE

- 1.3.1.** Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum 10 years experience in materials of like design and application.
- 1.3.2.** Installer:
- 1.3.2.1.** Installer: Company specializing in applying specified system with minimum 5 years documented experience.
- 1.3.2.2.** Installer: Company approved by materials manufacturer for specified guarantee work.

- 2.1.3.1.** Nominal Size: 21 inch diameter.
- 2.1.3.2.** Skylight Dome: Transparent, UV and impact resistant dome with flashing base supporting dome and top of tube.
 - 2.1.3.2.1.** Glazing: Type DA, 0.143 inch minimum thickness injection molded acrylic, classified as CC2 material; UV inhibiting, impact modified acrylic blend.
 - 2.1.3.2.2.** LightTracker Reflector: aluminum sheet, thickness 0.015 inch with Spectralight Infinity.
- 2.1.3.3.** Roof Flashing Base: Type F08, Self mounted, 8 inches high. one piece, seamless, leak-proof flashing functioning as base support for dome and top of tube, sheet steel, corrosion resistant conforming to ASTM A 653 or ASTM A 463, 0.028 inch thick. Provide manufacturer's standard extensions, insulations and gaskets as required for application.
- 2.1.3.4.** Dome Seal: Adhesive backed weatherstrip 0.63 inch tall by 0.28 inch.
- 2.1.3.5.** Provide Dome Edge Protection Band: Type PB, galvanized steel, Nominal thickness 0.039 inches.
- 2.1.3.6.** Tube Ring: Attached to top of base section; 0.090 inch nominal thickness injection molded high impact PVC.
- 2.1.4.** Product Characteristics: Reflective Tube Assembly.
 - 2.1.4.1.** Tubular shaft and light transmitting device: Spectralight Infinity high reflectance specular finish on exposed reflective surface. aluminum sheet, thickness 0.018 inch, tubular shaft. Provide all required fasteners and transitions, including Type 1 transition box to sealed ceiling diffuser.
 - 2.1.4.1.1.** Interior Finish: Specular reflectance for visible spectrum (400 nm to 760 nm) greater than 99 percent. Total solar spectrum reflectance (400 nm to 2500 nm) less than 93 percent.
 - 2.1.4.1.2.** Color: a* and b* (defined by CIE L*a*b* color model) shall not exceed plus 2 or be less than minus 2 as determined in accordance to ASTM E 308.
- 2.1.5.** Product Characteristics: Ceiling Diffuser Assembly.
 - 2.1.5.1.** Sealed Ceiling Diffuser: Ceiling mounted box transitioning from round tube to square ceiling assembly, supporting light transmitting surface at bottom termination of tube, with compression seal to minimize condensation and bug or dirt infiltration; 23.8 inches by 23.8 inches square frame to fit standard suspended ceiling grids or hard ceilings.
 - 2.1.5.1.1.** Round to square transition box made of opaque polymeric material, classified as CC2, Class C, 0.110 inch thick.
 - 2.1.5.1.2.** Natural Effect Lens made of acrylic, classified as CC2, Class C, 0.060 inch thick, with open cell foam seal to minimize condensation and bug, dirt, and air-infiltration per ASTM E 283.

2.1.5.1.3. Lens: Type L1 OptiView Fresnel lens design to maximize light output and diffusion with extruded aluminum frame. Visible Light Transmission shall be greater than 90 percent at 0.022 inch thick.

2.1.5.1.4. Secondary Diffuser: Type SS, Acrylic, 0.100 inches thick.

2.1.5.2.

2.1.6. Fire/Life Safety/Habitability Criteria.

2.1.6.1. Dome Light Transmission: Minimum 0.91 visual light transmission.

2.1.6.2. Air Infiltration Test: Maximum Air infiltration 0.30 cfm/sf aperture with a pressure delta of 1.57 psf across the tube when tested in accordance with ASTM E 283.

2.1.6.3. Water Resistance Test: No uncontrolled water leakage at 10.5 psf pressure differential with water rate of 5 gallons/hour/sf when tested in accordance with ASTM E 547.

2.1.6.4. Uniform Load Test:

2.1.6.4.1. No breakage, permanent damage to fasteners, hardware parts, or damage to make daylighting system inoperable or cause excessive permanent deflection of any section when tested at a Positive Load of 150 psf or Negative Load of 70 psf.

2.1.6.4.2. All units shall be tested with a safety factor of 3 times for positive pressure and 2 times for negative pressure, acting normal to plane of roof in accordance with ASTM E 330.

2.1.6.5. Fire Testing:

2.1.6.5.1. When used with the Dome Edge Protection Band, all domes meet fire rating requirements as described in the 2006 International Building Code.

2.1.6.5.2. Self-Ignition Temperature - Greater than 650 degrees F Per: U.B.C. Standard 26-6. See ASTM D-1929.

2.1.6.5.3. Smoke Density - Rating no greater than 450 Per U.B.C. 8-1 (See ASTM Standard E 84) in way intended for use. Classification C.

2.1.6.5.4. Rate of Burn and/or Extent - Maximum Burning Rate: 2.5 inches/min (62 mm/min) Classification CC-2: U.B.C. Standard 26-7. See ASTM D 635.

2.1.6.5.5. Rate of Burn and/or Extent - Maximum Burn Extent: 1 inch (25 mm) Classification CC-1: U.B.C. Standard 26-7. See ASTM D 635.

2.1.7. Finish:

2.1.7.1. Aluminum Frame: manufacturers standard.

2.1.7.2. Thermal Break Frame: White.

2.2. OTHER MATERIALS

2.2.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.2.1. Verify that deck is supported and secured.

3.1.1.2.2. Verify that deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drains, valleys or eaves.

3.1.1.2.3. Verify that surface substrate is properly prepared and dry.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

3.2.1. Install in accordance with manufacturer's instructions. Coordinate with installation of roofing system and related flashings. Provide weathertight installation.

3.2.2. Apply bituminous paint on metal surfaces of units in contact with cementitious materials and dissimilar metals.

3.2.3. Fasten to support members with corrosion resistant fasteners.

3.3. FIELD QUALITY CONTROL

3.3.1. After installation of first unit, field test to determine adequacy of installation. Conduct water test in presence of Owners representative.

3.3.2. Correct identified defects or irregularities.

3.4. CLEANING

3.4.1. Remove markings from finished surfaces.

- 3.4.2.** In areas where finished surfaces are soiled by adhesive or any other source of soiling caused by work of this Section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.
- 3.4.3.** Repair or replace defaced or disfigured finishes caused by work of this Section.

END OF SECTION

SECTION 08 71 00
DOOR HARDWARE

1. PART 1 - GENERAL

1.1. WORK INCLUDED

- 1.1.1.** Door hardware.
- 1.1.2.** Weatherstripping and gasketing.
- 1.1.3.** Thresholds, door stops, and related finish hardware.
- 1.1.4.** Scope of Work in this Section: Provide all finish hardware necessary to complete work.

1.2. WORK FURNISHED BUT INSTALLED UNDER OTHER SECTIONS

- 1.2.1.** Furnish templates to:
 - 1.2.1.1.** Section 08110 for door and frame preparation.
 - 1.2.1.2.** Section 08212 for door preparation.
 - 1.2.1.3.** *Section 08213 for door preparation.*
 - 1.2.1.4.** *Section 08410 for door and frame preparation.*

1.3. RELATED WORK

- 1.3.1.** Section 08110 - Steel Doors and Frames.
- 1.3.2.** Section 08112 - Wood Doors.
- 1.3.3.** *Section 08213 - Plastic Faced Wood Doors*
- 1.3.4.** *Section 08410 - Aluminum Entrances, Storefront and Windows.*
- 1.3.5.** *Section 08420 - Steel Entrances, Storefront and Windows.*

1.4. REFERENCES

- 1.4.1.** Builders' Hardware Manufacturers Association (BHMA) standards as specified.
- 1.4.2.** Steel Door Institute (SDI) standards as specified.
- 1.4.3.** Part 2, Title 24, CCR, 1998 edition, including all current amendments.
- 1.4.4.** Americans with Disabilities Act Accessibility Guidelines (ADAAG) criteria as specified.
- 1.4.5.** Underwriters Laboratories Inc. standards as specified.
- 1.4.6.** National Fire Protection (NFPA) standards as specified.

1.5. QUALITY ASSURANCE

- 1.5.1.** Hardware Supplier: Provide hardware from company specializing in supplying institutional door hardware with 5 years experience and approved by hardware manufacturer. Supplier shall have in its employ a certified Architectural Hardware Consultant (AHC) to prepare submittals required by this Section and who shall be available at reasonable times, during the course of the work, for project hardware consultation to the Owner, Architect, and Contractor. In addition AHC shall certify hardware installation as specified in this Section.
- 1.5.2.** Hardware supplier shall have a maintenance and service facility located within 100 miles of the project site. This facility will stock parts for products supplied and be capable of repairing and replacing hardware items found defective within the warranty period.

1.6. REGULATORY REQUIREMENTS

- 1.6.1.** Hardware shall be tested and listed per UL10C and the requirements of UBC Standard 7-2. Furnish letter of compliance from each manufacturer in the submittals for each type of rated opening.
- 1.6.2.** Conform to applicable requirements of the Americans with Disabilities Act Accessibility Guidelines regarding accessibility requirements for door and entrance hardware.
- 1.6.3.** Conform to applicable requirements of Title 24, Part 2, CCR regarding exiting and accessibility requirements for door and entrance hardware.

1.7. CERTIFICATIONS

- 1.7.1.** Architectural Hardware Consultant provided by Contractor shall inspect preparation and initial installation of each type of hardware condition.
- 1.7.2.** Architectural Hardware Consultant provided by Contractor shall inspect the completed installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

1.8. SUBMITTALS

- 1.8.1.** Submit schedule and product data under provisions of Section 01330.
- 1.8.2.** Provide seven (7) copies of typed DHI vertical format hardware schedules showing each application, the quantity required, part numbers and finish of each item.
 - 1.8.2.1.** Architects review of such schedule does not relieve the Contractor of providing all hardware required for the Work, whether or not such hardware was inadvertently omitted from Submittal. No extra cost will be allowed for changes or corrections necessary to facilitate the proper installation of hardware.
- 1.8.3.** Accompanying schedules, provide two (2) manufacturer's brochures of each item specified and scheduled, indicating function, finish, dimensions, and related features. Include manufacturer's statement of Year 2000 Compliance as defined in Section 01450, for electronic door and security hardware using computer processing. No hardware schedules will be accepted for review without submission of such brochure package.
- 1.8.4.** When alternate manufacturers are proposed by contractor, provide two brochures of originally specified item, marked to identify original specified item.

- 1.8.5.** Submit only manufacturers specified as approved alternates.
- 1.8.6.** Provide samples indicating hardware design and finish when required by Architect.
- 1.8.7.** Provide shop drawings showing all boxes, wiring and/or other support components of hardware assemblies enclosed or embedded in construction.

1.9. COORDINATION

- 1.9.1.** Coordinate work of this Section with other directly affected Sections involving manufacturer of any internal reinforcement for door hardware.
 - 1.9.1.1.** In particular, coordinate door preparation in accordance with applicable regulatory and trade standards specified.
- 1.9.2.** Review all details and conditions prior to ordering hardware. If door hand is changed during construction, coordinate and change all hardware as necessary at no cost to the Owner.

1.10. OPERATION AND MAINTENANCE DATA

- 1.10.1.** Submit operation and maintenance data under provisions of Section 01770.
- 1.10.2.** Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

1.11. DELIVERY, STORAGE, AND HANDLING

- 1.11.1.** Deliver products to site under provisions of Section 01600.
- 1.11.2.** Store and protect products under provisions of Section 01600.
- 1.11.3.** Package hardware items individually; label and identify package with door opening code to match hardware schedule.

1.12. MAINTENANCE MATERIALS

- 1.12.1.** Provide special wrenches and tools applicable to each different or special hardware component.
- 1.12.2.** Provide maintenance tools and accessories supplied by hardware component manufacturer.

1.13. WARRANTY AND GUARANTY

- 1.13.1.** Provide warranty from hardware supplier against all defects on all hardware, including electrical components, as follows:
 - 1.13.1.1.** Closers: Ten years, except electronic closers shall be warranted for two years.
 - 1.13.1.2.** Exit Devices: Three years.
 - 1.13.1.3.** Hinges: Life of the building.
 - 1.13.1.4.** All other hardware: Two years.

1.13.2. CONTRACTORS GUARANTEE

1.13.2.1. Provide, in Architect approved form, the Owner with a guarantee against the following specific defects or failures for a period of three (3) years after Notice of Substantial Completion:

1.13.2.1.1. Loose or misaligned components, resulting in the inability for the hardware assembly to function as intended or in compliance with applicable regulations.

1.13.2.1.2. Finish failure, including rust, pitting, flaking and other finish appearance defects.

1.13.2.2. Submit Guarantee on form provided in Document 00630.

2. PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section and Hardware Schedule, are indicated to establish required level of quality, appearance, and performance. The Architect will consider comparable products by alternate manufacturers where listed without note of No Substitution. Requests for substitutions, under the provisions of Section 01610.

2.1.2. Obtain each kind of hardware (latch and locksets, exit devices, hinges, and closers) from one manufacturer for each type of hardware.

2.2. DOOR HARDWARE CRITERIA

2.2.1. Manufacturers:

2.2.1.1. Hinges: Ives (IVE), Bommer.

2.2.1.2. Locks , Latchsets and Cylinders: Best (BES) – No Substitution.

2.2.1.3. Panic Devices: Von Duprin (VON) – No Substitution.

2.2.1.4. Closers: LCN (LCN) – No Substitution.

2.2.1.5. Overhead Stops: Glynn Johnson (GLY), Rixson.

2.2.1.6. Stop, Anchors and Door Bumpers: Ives (IVE), Trimco (TRM). BBW.

2.2.1.7. Seals, Door Bottoms: National Guard (NGP), Reese, Zero.

2.2.1.8. Lock Guards: Ives (IVE), Trimco, BBW.

2.2.2. Finishes

2.2.2.1. Finishes are identified in Schedule at end of this Section.

2.2.2.2. Where finish not shown, match finish of lockset.

2.2.2.3. Provide brown colored seals unless specified otherwise.

2.2.2.4. Provide fasteners matching in finish, base material and color.

2.2.3. Door Closers:

2.2.3.1. Secure closer base or shoe to door with sex bolt fasteners, painted to match closer finish.

2.2.3.2. Provide parallel arm design, mounted on door, push side, unless noted otherwise.

2.2.3.3. Provide all required shoes, drop brackets, extension and long arms as required to install in designated location.

2.2.3.4. Provide fire retardant fluid in closers for rated openings in compliance with UBC Standard 7-2 and UL 10C.

2.2.3.5. Where door is indicated as having fire resistance rating, provide UL Listed and labeled hardware.

2.2.4. Door Butts:

2.2.4.1. Unless noted otherwise, provide steel hinges, sheradized, with finish as shown in schedule. Provide pre-finish equivalent to Stanley "K" at all exterior doors.

2.2.4.2. Unless noted otherwise, provide hinges in accordance with following schedule.

2.2.4.2.1. Doors up to 4 feet 0 inches high: 2 hinges.

2.2.4.2.2. Doors 4 feet 0 inches to 7 feet 5 inches high: 3 hinges minimum.

2.2.4.2.3. Doors greater than 7 feet 5 inches high: 4 hinges minimum.

2.2.4.2.4. Provide extra heavy weight hinges on doors over 3 feet 5 inches wide.

2.2.4.3. Unless otherwise noted or required, provide full mortise hinges, with non-rising loose pins, ball bearing or oilite bearings, and hospital tips.

2.2.4.4. Provide set screw (NRP) type at exterior outswing doors to prevent pin removal when door is in closed position.

2.2.4.5. Where necessary to maintain door clearance at jamb trim, frame conditions, door reveals and similar conditions, furnish wide throw hinges as approved by the Architect.

2.2.4.6. Where door is indicated as having fire resistance rating, provide UL Listed and labeled hardware.

2.2.5. Locksets, Latchsets and Strikes

2.2.5.1. Unless noted otherwise in schedule, all locksets, latchsets, cylinders and component parts shall be the products of a single manufacturer.

2.2.5.2. Provide strikes at all locks with curved lip of sufficient length to protect trim and jamb. Each strike shall include wrought strike box.

- 2.2.5.3.** Unless noted otherwise, provide lever handles at all locks, latches, and other door hardware. Provide lever design with maximum of 1/2 inch handle return, measured from door face.
- 2.2.5.4.** Unless noted otherwise, provide 2-3/4 inch backset. Provide minimum 3/4 inch throw on all latchsets and locksets.
- 2.2.5.5.** Provide door locks complying with Section 1003.3.1.8, Part 2, Title 24, CCR.
- 2.2.5.6.** Where shown, provide panic devices complying with Section 1003.3.1.9, Part 2, Title 24, CCR and UBC Standard 10-4.
- 2.2.5.7.** Where specified, provide panic exit device with all required labels. Where panic exit device is required on fire rated doors, provide UL label with supplementary marking on door and hardware indicating compliant fire exit hardware.
- 2.2.5.7.1.** Provide glass bead kits of proper thickness where the rail assembly of the exit device crosses a lite.
- 2.2.5.8.** Where door is indicated as having fire resistance rating, provide UL Listed and labeled hardware.

2.2.6. Fasteners

- 2.2.6.1.** Unless noted otherwise, provide countersunk, full thread, flat head Phillips screw fasteners. Provide machine screws at metal substrates and wood screws at wood substrate.
- 2.2.6.2.** Provide lead shields or similar anchor devices for items fastened to concrete or masonry.

2.2.7. Thresholds

- 2.2.7.1.** Unless noted otherwise, provide aluminum finish thresholds, with proper anchor, insert and fastener.
- 2.2.7.2.** Unless shown otherwise, provide thresholds as indicated in Hardware sets.
- 2.2.7.3.** All thresholds shall comply with Section 1003.3.1.6.1a and 1133B.2.4.1.

2.2.8. Kickplates and Accessories

- 2.2.8.1.** Unless noted otherwise, provide stainless steel kickplates, 18 gauge, B4E finish. Provide 10 inches high, 2 inches less than door width, with beveled/eased edges.
- 2.2.8.2.** Floor mounted door stops are prohibited where located in the path of travel. Where provided, install maximum 4 inches from wall surface parallel to the direction of travel.

2.2.9. Seals

- 2.2.9.1.** Unless noted otherwise, provide seals complete with retainers, fasteners and trim.
- 2.2.9.2.** Provide UL Listed seals at all rated openings.

- 2.2.9.3.** Unless noted otherwise, provide brush, silicone or polyurethane seals at all door jamb and head conditions. Use of vinyl seals prohibited.
- 2.2.9.4.** Where specified, provide solid neoprene seals complying with MilSpec R6855, Class II, Grade 40. Provide sponge neoprene seals complying with MilSpec R6130, Class II, Grade C.

2.3. KEYING

- 2.3.1.** All permanent cores to be Best with 'L' keyway with A2 system to match existing system.
- 2.3.2.** Stamp master keys and grand master keys with a registry number. Do not stamp "Master" or letter "M".
- 2.3.3.** Stamp individual room keys with plain identification number. Do not indicate key cut.
- 2.3.4.** Factory cut all keys and stamp "DO NOT DUPLICATE".
- 2.3.5.** All locksets and cylinders shall be construction keyed. Provide brass construction cores.
- 2.3.6.** Hardware supplier shall meet with the Owners Representative to establish the keying schedule and to provide the correct grand, master, pass and change key groups to properly operate all locking devices.
 - 2.3.6.1.** Owner will install permanent cores in all locksets and cylinders.
- 2.3.7.** Provide record and registration system as directed by Architect.
- 2.3.8.** All locksets and cylinders shall be keyed, masterkeyed, and grand masterkeyed at the factory. Supply 4 change keys for each lock and one master and grand master for each set of locks.
- 2.3.9.** Contractor shall be responsible for completion of keying schedule and ordering all construction and permanent keys.
- 2.3.10.** Deliver keys directly to Owner by registered security shipment direct from hardware manufacturer. Hardware supplier shall not cut keys.

2.4. OTHER MATERIALS

- 2.4.1.** Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

- 3.1.1.** Inspection
 - 3.1.1.1.** Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
 - 3.1.1.2.** Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.2.1. Verify that power supply of proper voltage and type is available to power operated devices.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

3.2.1. Install hardware in accordance with manufacturer's instructions and requirements of SDI, ANSI/NFPA 80, WIC, and BHMA. Select applicable standard based on door function, type and regulatory criteria.

3.2.1.1. On fire labeled doors, do not field machine any door assemblies.

3.2.1.2. Install hardware in accordance with NFPA 80, the manufacturers listing requirements and UBC Standard 7-2 and UL 10C for positive pressure labeling requirements on fire labeled doors.

3.2.2. Install hardware using templates provided by hardware item manufacturer.

3.2.2.1. Prior to finishing door, fit hardware to door, utilizing fasteners and templates as specified.

3.2.2.2. Remove hardware, carefully label and store. Where door is existing and designated to receive new finish, remove all existing hardware.

3.2.2.3. Re-install after door finish is complete.

3.2.3. Unless noted otherwise or shown on drawings, mount hardware in accordance with the following criteria:

3.2.3.1. Hinges:

3.2.3.1.1. Top and Bottom Hinge: 9-5/8 inches to center of hinge.

3.2.3.1.2. Intermediate Hinge(s): Equally spaced between top and bottom hinge center line

3.2.3.2. Latchset and lockset handle: 38 inches above floor. Verify manufacturers template with door design.

3.2.3.3. Dead Locks: 44 inches.

3.2.3.4. Panic Devices: 36 to 40 inches above floor. Verify manufacturers template with door design.

3.2.3.5. Push Plate: 40 inches.

3.2.3.6. Door Pulls: 40 inches.

3.2.4. Adjust closer operating effort to conform to Section 1003.3.1.5 and 1133B.2.5, Part 2, Title 24 CCR.

3.2.4.1. Interior Doors: 5.0 pounds opening force.

3.2.4.2. Exterior Doors: 8.5 pounds opening force.

3.2.4.3. Fire Rated Doors: 15.0 pounds opening force.

3.2.5. Adjust closer delay and operating speeds to comply with requirements of Chapter 11B, Part 2, Title 24 CCR and the Americans with Disabilities Act Architectural Guidelines, Article 4.13.10.

3.2.5.1. Closer Certification: Provide written certification, signed by door closer representative, stating all closers were inspected and installed in accordance with specified opening force and delay requirements.

3.2.6. Install closers on push side of door with sex bolts.

3.2.7. Install thresholds in full bed of sealant at front and side edges.

3.3. DOOR HARDWARE SCHEDULE.

HW SET: 01

1	EA	CONTINUOUS HINGE	224HD	628	IVE
1	EA	CLSRM SEC. LOCK	93K7IN 15D S3	626	BES
1	EA	LOCK GUARD	LG1	600	IVE
1	EA	CLOSER/STOP/HOLD	4041 HCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW .050 B4E	630	IVE
1	SET	SEALS	160SA	AL	NGP
1	EA	DOOR SWEEP	200NA	AL	NGP
1	EA	THRESHOLD	426E LA & MS	AL	NGP

HW SET: 02

1	EA	CONTINUOUS HINGE	224HD	628	IVE
1	EA	STOREROOM LOCK	93K7D 15D S3	626	BES
1	EA	LOCK GUARD	LG1	600	IVE
1	EA	CLOSER/STOP/HOLD	4041 HCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW .050 B4E	630	IVE
1	SET	SEALS	160SA	AL	NGP
1	EA	DOOR SWEEP	200NA	AL	NGP
1	EA	THRESHOLD	426E LA & MS	AL	NGP

HW SET: 03

1	EA	CONTINUOUS HINGE	224HD	628	IVE
1	EA	PANIC DEVICE	CD99NL-OP	626	VON
1	EA	RIM CYLINDER	1E72	626	BES
1	EA	MORTISE CYLINDER	1E74	626	BES
1	EA	DOOR PULL	VR910NL	630	IVE
1	EA	CLOSER/ STOP	4041 CUSH	689	LCN
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 04

1	EA	CONTINUOUS HINGE	224HD	628	IVE
1	EA	PANIC DEVICE	CD99NL-OP	626	VON
1	EA	RIM CYLINDER	1E72	626	BES
1	EA	MORTISE CYLINDER	1E74	626	BES
1	EA	DOOR PULL	VR910NL	630	IVE
1	EA	CLOSER/STOP/HOLD	4041 HCUSH	689	LCN
1	EA	ARMOR PLATE	8400 35" X 2" LDW .050 B4E	630	IVE
1	SET	SEALS	160SA	AL	NGP
1	EA	DOOR SWEEP	200NA	AL	NGP
1	EA	THRESHOLD	426E LA & MS	AL	NGP

HW SET: 05

ALL HDWE. BY DR. MFG.

HW SET: 06

3	EA	HINGES	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	STOREROOM LOCK	93K7D 15D S3	626	BES
1	EA	SURFACE CLOSER	4041 EDA	689	LCN
1	EA	WALL STOP	WS401CVX	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 07

3	EA	HINGES	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	93K7R 15D S3	626	BES
1	EA	OVERHEAD STOP	904S	630	GLY
1	EA	KICK PLATE	8400 10" X 2" LDW .050 B4E	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 08

3	EA	HINGES	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	93K7R 15D S3	626	BES
1	EA	KICK PLATE	8400 10" X 2" LDW .050 B4E	630	IVE
1	EA	WALL STOP	WS401CVX	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 09

3	EA	HINGES	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	93K7R 15D S3	626	BES
1	EA	KICK PLATE	8400 10" X 2" LDW .050 B4E	630	IVE
1	EA	FLOOR DOME STOP	FS436	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

END OF SECTION

SECTION 08 81 00
GLASS AND GLAZING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Glass and glazing for windows and doors.

1.2. REFERENCES

- 1.2.1.** ASTM C-1036 - Standard Specification for Flat Glass.
- 1.2.2.** ASTM C- 1048 - Standard Specification for Heat-Treated Flat Glass - Kind FT Coated and Uncoated Glass.
- 1.2.3.** Glass Association of North America (GANA) (formerly FGMA) - Glazing Manual.
- 1.2.4.** IBC Chapter 24, current edition.

1.3. QUALITY ASSURANCE

- 1.3.1.** Conform to GANA Glazing Manual for glazing installation methods.
- 1.3.2.** Manufacturer: Manufacturer shall have produced the specified system or products for a period of one (1) year prior to beginning work of this section, and shall have the capability to produce the specified products to the delivery and quantity criteria of the project.
- 1.3.3.** Staff:
- 1.3.3.1.** Use only personnel who are thoroughly trained and experienced in the skills required and have installed similar applications of the specified products within one year prior to beginning work of this section.
- 1.3.3.2.** Use only staff who are completely familiar with the manufacturers' recommended methods of installation as well as the requirements of this work.

1.4. SUBMITTALS

- 1.4.1.** Submit in accordance with the provisions of Section 01 33 00.
- 1.4.2.** Materials List: Provide complete list of all proposed materials and accessories, including product data on performance criteria.
- 1.4.3.** Samples: Accompanying materials list, submit three 12 inch square samples of each glass type. Grind and seal all edges.
- 1.4.4.** Shop Drawings: Provide complete shop drawings indicating glass type, installation method, and materials used.

1.5. DELIVERY, STORAGE, AND PROTECTION

1.5.1. Deliver products to site under provisions of the General Conditions.

1.5.2. Store and protect products under provisions of the General Conditions.

1.6. WARRANTY

1.6.1. Warranty:

1.6.1.1. Provide, in Architect approved form, the Owner with a guarantee against the following specific defects or failures for a period of three (3) years after Notice of Substantial Completion:

1.6.1.1.1. Broken, cracked or otherwise damaged glass not resulting from vandalism.

1.6.1.1.2. Water intrusion through sealant/glass joint.

1.6.1.1.3. Sealant failure.

1.6.1.1.4. Fogging or delamination at laminated glass.

1.6.2. Insulating Glass Warranty:

1.6.2.1. Provide, in Architect approved form, the Owner with manufacturers warranty against the following specific defects or failures for a period of ten (10) years after Notice of Substantial Completion:

1.6.2.1.1. No material obstruction of vision through glass caused by accumulation of dust, moisture or film on the internal surface of glass caused by insulating seal failure.

1.6.2.1.2. Water intrusion through sealant/glass joint.

1.7. EXTRA MATERIALS

1.7.1. Provide one (1) glass panels of each type and size of exterior glass, stored as directed by Owner.

2. PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. INSULATING GLASS UNIT, FULLY TEMPERED – GL-1

2.2.1. Fabricator: Fabricator: Oldcastle Glass, www.OldcastleGlass.com, or equal.

2.2.2. Series/Type: Dual glazed glass units, fully tempered.

2.2.2.1. Exterior Lite: 1/4-inch PPG Solarban 80 Clear on Surface 2.

2.2.2.2. Interior Lite: 1 / 4 inch PPG clear.

2.2.3. Total Thickness: One inch, and as required by code, with 1/2 inch air space.

2.2.4. Characteristics:

2.2.4.1. Strength: Each lite fully Tempered (Kind FT) per ASTM C 1048 and ASTM C 1036. Permanently label all tempered glass.

2.2.4.2. SHGC: 0.24.

2.2.4.3. Visible Light Transmission: 48 percent.

2.2.4.4. Shading Coefficient: 0.28.

2.2.4.5. U-value – Summer Daytime: 0.27.

2.2.4.6. U-value – Winter Night: 0.29.

2.2.4.7. Safety Standards: Comply with CBC Chapter 24, safety glazing requirements.

2.2.4.8. Seal Classification: Class CBA per ASTM E 773/774, with third party validation required.

2.2.5. Accessories:

2.2.5.1. Capillary Tubes: Provide capillary tubes at units as recommended by manufacturer for installed altitude conditions.

2.2.6. Accessories:

2.2.7. Capillary Tubes: Provide capillary tubes at units as recommended by manufacturer for installed altitude conditions.

2.3. LAMINATED VISION GLASS:TYPE GL-2

2.3.1. Manufacturer:

2.3.1.1. Glass: Provide same glass manufacturer as non-laminated glass.

2.3.1.2. Laminated Interlayer: Solutia or approved equal.

2.3.2. Type: Single light, two ply, laminated clear float glass.

2.3.3. Characteristics:

2.3.3.1. Total Thickness: 5/8 inch

2.3.3.2. Glass Characteristics:

2.3.3.2.1. Outer Ply: Heat Strengthened Kind HT, 1/4 inch float glass per ASTM C 1036 and C 1048.

2.3.3.2.2. Inner Ply: Heat Strengthened, Kind HT, 3/8 inch float glass, per ASTM C 1036 and C 1048.

2.3.3.2.3. Type: Condition A - uncoated, Type 1 - transparent, Class 1 - clear, q3 quality - glazing select, float glass.

2.3.3.3. Interlayer Characteristics:

2.3.3.3.1. Material: PVB

2.3.3.3.2. Series: Solutia Saflex

2.3.3.3.3. Thickness: 0.030 inches

2.3.3.3.4. Color: Clear

2.3.3.4. Safety/Habitability Characteristics:

2.3.3.4.1. Light Transmission: 89% visible light approximately.

2.3.3.4.2. Sound Reduction Rating: STC 40 per ASTM E 90.

2.3.3.4.3. Safety Standards: Comply with Chapter 24, Part 2, Title 24, CCR safety glazing requirements.

2.4. GLASS DESIGN CRITERIA

2.4.1. Provide glass thickness, edge support, "bite," and other engineering criteria per referenced standards and IBC Chapter 24.

2.4.2. Provide glass that has been produced, fabricated, and installed to withstand normal thermal movement and wind loading, without failure, including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glass and glazing materials and other defects in the work.

2.4.2.1. Normal thermal movement is defined as that resulting from a consequent temperature range of +10 degrees F to +180 degrees F within glass and glass framing members.

2.4.3. Provide glass thickness in minimum thickness specified and as required by Chapter 24, IBC and the following criteria:

2.4.3.1. Wind Speed: 90 MPH wind speed, (3 second gust)

2.4.3.2. Exposure: Exposure C.

2.4.4. Provide safety glazing complying with at all locations as required by Chapter 24, IBC.

2.4.4.1. Provide permanent etched or ceramic fired label on all safety glazing, visible after installation.

2.5. GLAZING ACCESSORIES

2.5.1. Setting Blocks: Neoprene or EPDM with a Shore A Durometer value of 85 +_ 5.

2.5.2. Spacer Shims: Neoprene with a Shore A Durometer value of 50.

2.5.3. Foam Glazing Tapes / Beads: Provide manufacturers recommended system, UV Stabilized, black color.

2.6. OTHER MATERIALS

- 2.6.1.** Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

- 3.1.1.1.** Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
- 3.1.1.2.** Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
- 3.1.1.2.1.** Verify surfaces of glazing channels or recesses are clean and free of obstructions.
- 3.1.1.2.2.** Verify insulating glass unit sealant is compatible with window system glazing methods specified in Section 08 11 00.
- 3.1.1.3.** In the event of discrepancy, immediately notify the Architect.
- 3.1.1.4.** Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. GLASS INSTALLATION

3.2.1. General

- 3.2.1.1.** Install all glass at proper ambient temperatures.
- 3.2.1.2.** Do not glaze assemblies when damp or wet due to rain, dew, condensation, or other moisture sources.
- 3.2.1.3.** Protect glass from edge damage during handling and installation; use a rolling block in rotating glass units to prevent damage to glass corners.
- 3.2.1.4.** Do not impact glass with metal framing.
- 3.2.1.5.** Use suction cups to shift glass units within openings; do not raise or drift glass with a pry bar.
- 3.2.1.6.** Rotate glass with flares or bevels along one horizontal edge which would occur in vicinity of setting blocks so that these are located at top of opening.
- 3.2.1.7.** Remove from project and dispose of glass units with edge damage or other imperfections of the type that, when installed, weaken glass and impair performance and appearance.

- 3.2.1.8.** Install all glass within ambient temperature limits established by glass manufacturer.
 - 3.2.1.9.** Set units of glass in each series with uniformity of pattern, draw, bow, and similar characteristics.
- 3.2.2.** Install all glass products in accordance with referenced codes, standards, and approved submittals. Install per recommendations of manufacturer, and as specified in related sections.
- 3.2.3.** Install in accordance with Listing and labeling requirements.
 - 3.2.3.1.** Install wire glass with mesh pattern aligned vertically and horizontally.
- 3.2.4.** Rest glass on setting blocks per referenced standard.
 - 3.2.4.1.** Install neoprene or EPDM setting blocks. No lead setting blocks permitted.
 - 3.2.4.2.** Provide minimum 4 inch long setting block, and as required by glass manufacturer. Install at quarter points unless otherwise approved.
 - 3.2.4.3.** Provide setting block width 1/16 to 1/8 inch less than the width of the glazing pocket, and a minimum of 1/8 inch wider than glass thickness.
 - 3.2.4.4.** Provide edge blocking at all jamb conditions of captured pocket glazing.

3.3. PROTECTION AND CLEANING

- 3.3.1.** Protect glass from breakage immediately upon installation by use of crossed streamers attached to framing and held away from glass. Do not apply tape or marking of any kind to glass surface. Remove non-code required and non-permanent labels.
- 3.3.2.** Remove tape after work is completed.
- 3.3.3.** Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove immediately by method recommended by glass manufacturer.
- 3.3.4.** Examine glass surfaces adjacent to or below exterior plaster, concrete and other masonry surfaces at frequent intervals during construction, but not less often than once a month, for build-up of dirt, scum, alkali deposits or staining. When examination reveals presence of these forms of residue, remove by method recommended by glass manufacturer. Remove tape after work is completed.
- 3.3.5.** Do not store materials or any kind against interior or exterior surfaces of glass or glass frame. Remove tape after work is completed.
- 3.3.6.** Immediately prior to completion of the Work, clean all glass using manufacturers approved methods.

3.4. REPLACEMENT

- 3.4.1.** Immediately remove all glass delivered to site with manufacturing or fabrication defects.
- 3.4.2.** Remove and replace all glass broken, cracked, abraded or damaged in any other way during construction period due to construction, vandalism, natural occurrences or other causes.

3.4.2.1. Comply with scratch tolerances specified below for all glass.

3.4.3. Immediately remove all glass delivered to site with manufacturing or fabrication defects defined as follows:

3.4.3.1. Based on inspection from a distance of 6 feet, pinholes exceeding 1/16 inch in diameter are not acceptable.

3.4.3.2. Based on inspection from a distance of 6 feet, clusters of pinholes less than 1/16 inch in diameter shall not occur in the central 80 percent of the glass.

3.4.3.3. Based on inspection from a distance of 10 feet, scratches exceeding 2 inches are not acceptable, except scratches up to 3 inches in length will be acceptable if located a maximum of 3 inches of glass edge.

3.4.3.4. Concentrated scratched or abraded areas are not acceptable at any part of glass panel.

END OF SECTION

SECTION 09 20 00
PORTLAND CEMENT PLASTER

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Metal lath.
- 1.1.2.** Portland cement plaster system, exterior.
- 1.1.3.** Plaster accessories.

1.2. REFERENCES

- 1.2.1.** ASTM C144 - Aggregate for Masonry Mortars.
- 1.2.2.** ASTM C150 - Portland Cement.
- 1.2.3.** ASTM C 206 - Finishing Hydrated Lime.
- 1.2.4.** ASTM C 926 – Application of Portland Cement Plaster
- 1.2.5.** ASTM C 1063 – Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement Based Plaster
- 1.2.6.** ASTM E119 - Fire Test of Building Construction and Materials.
- 1.2.7.** Tech Bulletins and References as Published by Technical Services Information Bureau (TSIB), www.tsib.org.
- 1.2.8.** Portland Cement Plaster Stucco Resource Manual by Northwest Walls and Ceilings Bureau www.nwcb.org

1.3. QUALITY ASSURANCE

- 1.3.1.** Applicator: Company specializing in cement plaster work with 10 years documented experience in non-residential projects of similar scope.
- 1.3.2.** Supervision: Plaster assembly shall be installed under the full time supervision of a foreman with 10 years documented experience in non-residential projects of similar scope .
- 1.3.3.** Integrated Installation: Plaster assembly shall be installed under a single contract, responsible for all underlayment, lathing and plastering operations.
- 1.3.4.** Manufacturer: Where provided, company specializing in manufacturing premixed and engineered plaster products **for a minimum of 10 years.**

1.4. SUBMITTALS

- 1.4.1.** Provide submittals under provisions of Section 01 33 00.

1.4.2. Provide product data on plaster, lathing, and furring materials, characteristics and limitations of products specified.

1.4.3. Provide complete mix design for each application.

1.5. ENVIRONMENTAL REQUIREMENTS

1.5.1. Apply plaster materials when substrate or ambient air temperature is within manufacturers temperature ranges.

1.5.2. Maintain manufacturers minimum recommended ambient temperature during and after installation of plaster. Provide barriers, heaters and all other temporary facilities as required.

1.5.3. Take all precautions required to protect plaster from drying winds and other environmental impacts.

2. PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.1.1. PLASTER MATERIALS

2.1.2. Cement: ASTM C150, Type II Portland Cement, low alkali.

2.1.3. Use of plastic cement is not permitted.

2.2. PREMIXED PLASTER ALTERNATIVE

2.2.1. Premixed Basecoat Plaster: As a field mix alternate, provide LaHabra Basic926 sanded, BMI 690, or equal, with integral fiber reinforcing, complying with ASTM C 926 and IBC Chapter 25.

2.2.2. Premixed Finishing Coat: La Habra or equal, Exterior Stucco Color Coat, 20/30 mesh silica sand, premixed integral color finish coat.

2.2.2.1. Provide number pf integral color to match number of different paint colors for exterior plaster as provided in Section 09 91 00.

2.2.3. Provide premixed integral color to match existing building plaster color.

2.3. LATH

2.3.1. Self Furred Metal Lath: Cemco or equal, Cem-Lath, 3.4 lb/sq. yd, G40 galvanized finish, self-furring.

2.4. Combination lath and underlayment may be used with Architects prior approval. UNDERLAYMENT

2.4.1. Underlayment: Fortiber or equal, Super Jumbo Tex, exceeding FS-UU-B-790, type I, Grade D as specified:

2.4.1.1. Water vapor transmission: minimum 11 perms per ASTM E 96, method A

2.4.1.2. Water Resistance: Minimum 60 minutes per ASTM D 779.

2.4.1.3. Tensile Strength: Minimum 70 lb/inch MD/60 lb/inch CD.

2.5. ACCESSORIES

2.5.1. Edge accessories:

2.5.1.1. Manufacturer: Provide manufacturer as indicated or approved equal.

2.5.1.1.1. Aluminum Accessories: Provide products manufactured by Fry Reglet Corporation, www.fryreglet.com, or equal.

2.5.1.2. Casing Bead/Edge Termination:

Fry JPM-75, prime paint, with protective insert.

2.5.1.3. Control Joint/Reveal: Fry PCS-75-75, prime paint, with protective insert. Provide connector clip, end cap and compatible sealant bedding

2.5.1.4. Wire Ties: Soft annealed steel, galvanized; 18 gage.

2.5.2. Anchorage: Nails, staples, or other metal supports conforming to requirements of referenced standards, galvanized, of type and size to suit application and conforming to requirements of IBC Chapter 25 for conditions as required to rigidly secure lath, underlayment and associated accessories in place.

2.6. CEMENT PLASTER MIXES

2.6.1. Field Mix: Mix and proportion cement plaster in accordance with ASTM C 926, Table 3, for type C portland cement plaster. Do not add plasticizers of any kind. Incorporate specified fiber reinforcing in mix design.

2.6.2. Mix only as much plaster as can be used in one hour.

2.6.3. Protect mixtures from frost, contamination, and evaporation.

2.6.4. Do not retemper mixes after initial set has occurred.

2.7. OTHER MATERIALS

2.7.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

- 3.1.1.2.** Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 - 3.1.1.2.1.** Grounds and Blocking: Verify items within walls for other Sections of work have been installed.
 - 3.1.1.2.2.** Mechanical and Electrical: Verify services within walls have been tested and approved.
- 3.1.1.3.** In the event of discrepancy, immediately notify the Architect.
- 3.1.1.4.** Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

- 3.2.1.1.** Protect surfaces near the work of this Section from damage or disfiguration.

3.3. LATH INSTALLATION AT HORIZONTAL SOFFITS

- 3.3.1.1.** Apply paper backed metal lath taut, with long dimension perpendicular to supports in accordance with IBC Chapter 25.
- 3.3.2.** Lap ends and sides of metal lath minimum 1-1/2 inches. Secure laps with tie wire where they occur between supports.
- 3.3.3.** In addition to fastening methods required by IBC Chapter 25, provide 9 gage ring shank hook staple over 10d nail, at 27 inches on-center along joist support, and located not more than 3 inches from edge of lath.
- 3.3.4.** Place 4 x 12 inch strip of corner reinforcement lath diagonally at corners of openings and recessed light fixture frames. Secure rigidly in place.

3.4. PLASTER ACCESSORIES AND CONTROL JOINTS

- 3.4.1.** Place specified plaster accessories at terminations of plaster finish per ASTM C 1063.
 - 3.4.1.1.** Neatly miter or cope, corners and intersections of accessories to fit exposed edges.
 - 3.4.1.2.** Secure in place by wire tying to lath. Do not anchor to plywood sheathing or supports without Architects prior approval.
 - 3.4.1.3.** Where available from manufacturer, provide manufacturer's recommended connector clip and sealant bedding at all accessory intersections and joints.
 - 3.4.1.4.** Where available from manufacturer, provide manufacturer's end cap at locations where accessories terminate against door frames, wall surfaces and similar conditions.
- 3.4.2.** Install accessories to proper lines and levels. Provide 1/8 inch spacing at joints. Align intersections.
- 3.4.3.** Coordinate joint placement with naturally occurring joints of other related work. Do not extend lath across expansion or control joints in substrate.

3.4.4. Lath and Underlayment Installation at Accessories

3.4.4.1. Provide additional layer of water-resistant underlayment behind all accessories, 12 inches wide, centered on accessory.

3.4.4.2. In horizontal applications at wall conditions, install lath and underlayment over upper flange of accessory. Install lath over lower flange of accessory. Extend wall underlayment a minimum of 6 inches above upper flange.

3.4.5. Provide joints as shown on drawings. Where joints not shown, provide as directed by Architect in compliance with the following criteria:

3.4.5.1. In plastered ceilings and soffits, provide control joints as necessary to limit plaster area to approximately 75 square feet. Final location as directed by Architect..

3.5. PLASTERING

3.5.1. Apply plaster in accordance with referenced TSIB Tech Bulletins, IBC Chapter 25 and ASTM C 926.

3.5.1.1.

3.5.2. At soffits and ceilings, provide a combined thickness of 7/8 inch thickness at scratch and brown coats prior to application of finish coat.

3.5.3. Curing:

3.5.3.1. Moist cure scratch coat a minimum of 5 days prior to application of brown coat.

3.5.3.2. Dampen surface of scratch coat prior to application of brown coat.

3.5.3.3. Moist cure brown coat a minimum of 5 days, and cure for a total of 10 days prior to application of finish coat.

3.5.3.4. Moist cure finish coat for minimum period of 72 hours.

3.5.4. Finish Coat:

3.5.4.1. After brown coat curing time has elapsed, apply finish coat. Dampen base coat prior to applying finish coat.

3.5.4.2. Exterior Surfaces: Apply finish coat in medium dash finish as illustrated in "Plaster Textures" published by Plaster Information Bureau and matching approved sample.

3.5.4.3. Exterior Surfaces: Apply finish coat in texture matching existing plaster finish, and matching approved sample..

3.6. TOLERANCES

3.6.1. Exposed finish plaster: Maximum variation from true plane limited to 1/4 inch plus or minus, in 10 feet, non-cumulative.

3.7. CLEANING AND PROTECTION

3.7.1. Protect all aluminum frames, accessories, glass and thresholds from plaster application with complete waterproof protective sheeting or tape.

3.7.1.1. Verify tape compatibility with all prefinished coatings.

3.7.1.2. Do not allow tape or protection sheeting to contact glass.

3.7.1.3. Remove all covering and tape within two weeks of plaster completion in any one area.

3.7.2. During plaster operations, provide protection at all finished surfaces.

3.7.2.1. Remove all traces of spilled or splashed plaster from finished surfaces.

3.8. FIELD QUALITY CONTROL

3.8.1. The Owner reserves the right, prior to applying finish coat, to direct Contractor to remove 2 plaster assembly samples taken from in-place plaster at random locations as selected by Architect.

3.8.1.1. Remove plaster by saw-cutting through underlayment. Do not cut sheathing.

3.8.1.2. Samples shall be 24 inches square, and selected at locations to include lath and underlayment joint.

3.8.1.3. Repair plaster at sample area to match adjacent plaster, including providing additional underlayment shingle lapped with remaining underlayment.

3.8.2. Take all samples in the presence of the Architect.

3.8.3. The Architect will take possession of samples for inspection and testing, including plaster mix content and lath placement.

3.8.4. Cost of sample removal and repair will be paid by Owner if plaster complies with specification. Contractor shall pay for sample removal, repair, and all remedial work made necessary by non-compliance with the specification.

END OF SECTION

SECTION 09 21 16
GYPSUM BOARD ASSEMBLIES

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Gypsum board.
- 1.1.2.** Joint treatment and surface finishes.
- 1.1.3.** Metal support and furring systems.
- 1.1.4.** Metal suspension system for drywall ceiling assemblies.

1.2. WORK INSTALLED BUT FURNISHED UNDER OTHER SECTIONS

- 1.2.1.** Section 08 31 13 - Access Doors and Frames.

1.3. REFERENCES

- 1.3.1.** ASTM C 36 - Gypsum Wallboard.
- 1.3.2.** ASTM C 79 - Gypsum Sheathing Board.
- 1.3.3.** ASTM C 442 - Specification for Gypsum Backing Board and Coreboard.
- 1.3.4.** ASTM C 630 - Water Resistant Gypsum Backing Board.
- 1.3.5.** ASTM C 645 – Nonstructural Steel Framing Members
- 1.3.6.** ASTM C 1002 - Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases.
- 1.3.7.** ASTM E 119 - Fire Tests of Building Construction and Materials.
- 1.3.8.** Gypsum Association, "Levels of Gypsum Board Finish"
- 1.3.9.** ASTM C 36 - Gypsum Wallboard.

1.3.10. REGULATORY REQUIREMENTS

- 1.3.11.** Conform to IBC Chapter 25 for finish materials installation..

1.4. SUBMITTALS

- 1.4.1.** Provide submittals under provisions of Section 01 33 00.
- 1.4.2.** Submit product data indicating materials, joint toppings and finish materials, and accessories.
- 1.4.3.** Submit manufacturer's installation instructions.

1.5. QUALITY ASSURANCE

- 1.5.1.** Manufacturer: Provide company who has produced the specified products for a period of 5 years prior to beginning work of this Section and maintains the capability to provide the specified products in compliance with the delivery and quantity criteria for the Project.
- 1.5.2.** Installer: For installation of work, use only personnel who are thoroughly trained and experienced in the skills required, have installed similar applications of the specified products within one year prior to beginning work of this Section, and who are completely familiar with the manufacturers' recommended methods of installation as well as the requirements of this work.

2. PART 2 - PRODUCTS

2.1. MANUFACTURERS

- 2.1.1.** Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. GYPSUM BOARD

- 2.2.1.** Manufacturer: United States Gypsum (USG), www.usg.com or equal.
 - 2.2.1.1.** Provide the same manufacturer for all like products.
- 2.2.2.** Board Type:
 - 2.2.2.1.** Non-Rated: USG Regular per ASTM C36.
 - 2.2.2.1.1.** Edge: SW Tapered.
 - 2.2.2.1.2.** Thickness: 5/8 inch.
 - 2.2.2.2.** Fire Rated: USG FireCode Core (Type X) per ASTM C36.
 - 2.2.2.2.1.** Edge: SW Tapered.
 - 2.2.2.2.2.** Thickness: 5/8 inch.
 - 2.2.2.3.** Water Resistant: USG Mold Tough FireCode Core, Type X, per ASTM C1396.
 - 2.2.2.3.1.** Edge: Tapered.
 - 2.2.2.3.2.** Thickness: 5/8 inch.

2.3. ACCESSORIES

- 2.3.1.** Acoustical Sealant: USG, Non-hardening, non-skinning, conforming to ASTM C557 and C919, for use in conjunction with non-rated gypsum board assemblies.
- 2.3.2.** Drywall Joint and Edge Accessories:
 - 2.3.2.1.** Corner Bead: USG or approved alternate, paper faced metal.

- 2.3.2.2. Edge Trim: USG or approved alternate, paper faced metal.
- 2.3.2.3. Expansion Joint: USG 093 or approved alternate, metal.
- 2.3.3. Joint and Finishing Systems:
 - 2.3.3.1. Provide systems produced by same manufacturer as boards.
 - 2.3.3.2. Joint Systems: USG Ready Mixed Compounds, complying with ASTM C475, vinyl based, certified asbestos free.
 - 2.3.3.3. Finishing System Materials: USG Multi-Purpose or approved alternate, complying with ASTM C475, non-aggregate, vinyl based, certified asbestos free.
 - 2.3.3.4. Primer: Manufacturer's approved primer, compatible with finishes specified in other Sections.
- 2.3.4. Fasteners:
 - 2.3.4.1. Gypsum board screws: type and length as required by installation and UL Listing criteria.
 - 2.3.4.2. Gypsum board nails: type and length as required by installation and UL Listing criteria. Nails not permitted at interior gypsum board applications.
 - 2.3.4.3. Cementitious Backer Unit screws: corrosion resistant, type and length as required by manufacturer, installation and UL Listing criteria. Nails not permitted.
- 2.3.5. Adhesive: Manufacturer's approved adhesive for attachment to concrete surfaces.
- 2.3.5.1. Underlayment Membrane: Membrane complying with ANSI A 108.2-3.8.
- 2.4. OTHER MATERIALS
 - 2.4.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

- 3.1.1. Inspection
 - 3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
 - 3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 - 3.1.1.2.1. Verify framing members are properly installed and will comply with specified tolerances.

3.1.1.2.2. Verify that openings, curbs, pipes, sleeves, ducts, and vents are solidly set, and blocking and backing is in place.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

3.2.1. Insulation Coordination:

3.2.1.1. Verify insulation is fitted tightly within spaces, around cut openings, behind and around electrical and mechanical items within or behind partitions, and to items passing through partitions.

3.3. GYPSUM BOARD INSTALLATION

3.3.1. Install gypsum board in accordance with manufacturer's instructions and designated system number for fire rated assemblies.

3.3.1.1. Unless noted otherwise, utilize water resistant type for wall surfaces within four feet of the outermost edge of any plumbing fixture or moisture generating equipment. Extend water resistant gypsum board full height.

3.3.2. Do not use water resistant gypsum board on ceiling applications. Use screws of proper length when fastening gypsum board to framing, spaced at 8 inches on center maximum at each support.

3.3.3. Erect single layer fire rated gypsum board vertically, with edges and ends occurring over firm bearing.

3.3.4. Edge and Trim Installation:

3.3.4.1. Install corner beads at all external corners. Use longest practical length.

3.3.4.2. Install corner beads at all conditions where gypsum board abuts dissimilar materials.

3.3.4.3. Install angle reinforcement at interior corners.

3.3.4.4. Tape and finish joint reinforcement as specified.

3.3.5. Install acoustical sealant at wall edge perimeter, including floor edge, and at all penetrations where fire stopping is not required.

3.3.6. Gypsum Sheathing Installation:

3.3.6.1. Install gypsum sheathing in accordance with manufacturer's recommendations, including USG Systems Folder SA-700.

3.3.6.2. Install board with joints over supports. Space ends and edges 1/8 inch apart.

3.3.6.3. Install board using approved fasteners at maximum 8 inches on center at each support.

3.3.6.4. Apply approved sealant at sheathing edges and penetrations.

3.4. GYPSUM BOARD FINISH AND JOINT TREATMENT

3.4.1. Comply with descriptions and Finish Levels as specified and in accordance with referenced standard.

3.4.2. LEVEL 2 Finish: Gypsum board located above ceiling areas, plenums, and similar surfaces not visible in completed construction:

3.4.2.1. Embed tape at all joints and interior angles in joint compound.

3.4.2.2. Apply one separate coat of joint compound over all joints, angles, fastener heads, and accessories.

3.4.2.3. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable.

3.4.3. LEVEL 3 Finish: Gypsum board designated to receive rigid FRP or solid paneling.

3.4.3.1. Embed tape at all joints and interior angles in joint compound.

3.4.3.2. Apply two separate coats of joint compound over all joints, angles, fastener heads, and accessories.

3.4.3.3. All joint compound shall be smooth and free of tool marks and ridges.

3.4.3.4. Apply uniform coat of approved primer over entire surface with roller.

3.4.4. LEVEL 4 Finish – Match Adjacent Construction: Gypsum board designated to receive flat paint finish.

3.4.4.1. Embed tape at all joints and interior angles in joint compound.

3.4.4.2. Apply three separate coats of joint compound over all joints, angles, fastener heads, and accessories. Apply uniform coat of approved primer over entire surface with roller.

3.4.4.3. Apply texture coating over entire surface. Finish in "Knock-Down" texture as illustrated in USG Construction Handbook. Surface shall be smooth and free of tool marks and ridges.

3.4.4.4. Apply uniform coat of approved primer over entire surface with roller.

3.4.5. LEVEL 5 Finish – Match adjacent Construction: Gypsum board surfaces receiving eggshell, semi-gloss or gloss paint finish.

3.4.5.1. Embed tape at all joints and interior angles in joint compound.

3.4.5.2. Apply three separate coats of joint compound over all joints, angles, fastener heads, and accessories. Apply uniform coat of approved primer over entire surface with roller.

3.4.5.3. Apply texture coating over entire surface. Finish in "Orange Peel" texture as illustrated in USG Construction Handbook. Surface shall be smooth and free of tool marks and ridges.

3.4.5.4. Apply uniform coat of approved primer over entire surface with roller.

3.4.6. LEVEL 5 Finish - Smooth: Gypsum board surfaces receiving eggshell, semi-gloss or gloss paint finish.

3.4.6.1. Embed tape at all joints and interior angles in joint compound.

3.4.6.2. Apply three separate coats of joint compound over all joints, angles, fastener heads, and accessories. Apply uniform coat of approved primer over entire surface with roller.

3.4.6.3. Apply thin skim coat of joint compound over entire surface. Sand as necessary. Surface shall be smooth and free of tool marks and ridges.

3.4.6.4. Apply uniform coat of approved primer over entire surface with roller.

3.5. TOLERANCES

3.5.1. Comply with the following tolerances for level, plumb and flat. Where substrate framing will not comply with specified tolerances, correct deficiencies as required.

3.5.1.1. Level and Plumb: Plus or minus 1/4 inch in 10 feet, non-cumulative.

3.5.1.2. Flatness: No gaps exceeding 1/8 inch at any point under a 10 foot straight edge placed on surface in any orientation.

END OF SECTION

SECTION 09 22 16

NON-STRUCTURAL METAL STUD FRAMING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Steel non-structural light gage wall and horizontal framing for interior non-structural applications.
- 1.1.2.** Steel furring systems.
- 1.1.3.** Framing accessories.

1.2. REFERENCES

- 1.2.1.** ASTM A 653, Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron-Alloy Coated (Galvannealed) by the Hot-Dip Process.
- 1.2.2.** ASTM C 754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
- 1.2.3.** C 954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
- 1.2.4.** ASTM C 955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases
- 1.2.5.** ASTM C 1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories..
- 1.2.6.** ASTM A 1011 - Structural Steel, Sheet and Strip, Carbon, Hot-Rolled.
- 1.2.7.** ASTM E 119 – Standard Test Methods for Fire Tests of Building Construction Materials.
- 1.2.8.** E 1966 – Standard Test Method for Fire-Resistive Joint Systems.
- 1.2.9.** AISI NASPEC/NAS-01 - North American Specification For the Design of Cold-Formed Steel Structural Members, 2001 Edition and 2004 Supplement.

1.3. QUALITY ASSURANCE

- 1.3.1.** Provide full time quality control over fabrication and erection complying with applicable codes, ordinances, rules and regulations of government agencies having jurisdiction
- 1.3.2.** Provide sound rated assemblies with materials and construction approved in assembly as tested by ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

1.4. QUALIFICATIONS

- 1.4.1.** Manufacturer:

CFHS Kitchen and Performing Arts Expansion Project
Catalina Foothills School District
NTD # 2010-0138-00/2010-0323-00

NON-STRUCTURAL METAL STUD FRAMING
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1.4.1.1. Manufacturer with a demonstrated history of producing the specified products for a period of five (5) years prior to beginning work of this section, and with the capability to produce the specified products to the delivery and quantity criteria of the project.

1.4.1.2. Current member of SSMA with current Quality Assurance Program.

1.4.2. Installing Contractor Qualifications

1.4.2.1. Company specializing in installation of work of this Section, with minimum 5 years documented experience in installation of projects of similar scale and scope.

1.4.2.2. Company has installed similar applications of the specified products within one year prior to beginning work of this section.

1.4.2.3. Welders shall be certified for welding with light gauge metals in compliance with all applicable AWS requirements.

1.4.2.4. Installing Foreman: Individual specializing in installation of work of this Section, with minimum 5 years documented experience in installation of projects of similar scale and scope.

1.4.2.5. Use only staff who are completely familiar with the manufacturers' recommended methods of installation as well as the requirements of this work.

1.5. SUBMITTALS

1.5.1. Submit product data under provisions of Section 01 33 00.

1.5.2. Product Data:

1.5.2.1. Submit a complete list of all materials proposed to be furnished and installed under this portion of the work.

1.5.2.2. Provide current ICC ES report showing compliance with specified references.

1.5.2.3. Provide framing member materials, dimensions, structural properties and finishes.

1.5.2.4. Provide fastener and anchor data, including type, size, corrosion resistance and load capacity.

1.5.3. Manufacturers' Recommendations: Accompanying the materials list, submit two copies of the manufacturer's current recommended method of installation for each item.

1.5.4. Shop Drawings

1.5.4.1. Accompanying materials list, submit complete shop drawings for all metal framing applications.

1.5.4.2. Detail all connections, including sill/stud track and top runner/ stud track.

1.5.4.3. Detail framing assembly for all openings, bracing and transitions in direction or plane of framing.

1.6. FIELD MEASUREMENTS

- 1.6.1.** Verify field measurements are as shown on shop drawings.

1.7. DELIVERY, STORAGE AND HANDLING

- 1.7.1.** Deliver and store on site under the provisions of Section 01 60 00.
- 1.7.2.** Store materials above ground, protected from dirt, grease, corrosion and other damage.
- 1.7.3.** Store all other materials in a waterproof manner.
- 1.7.4.** Provide original packaged welding electrodes, clearly marked as to type and rating.
- 1.7.5.** Do not store materials on structure in a manner causing potential distortion or damage to members, surfaces, or supporting structures.

2. PART 2 - PRODUCTS

2.1. MANUFACTURERS

- 2.1.1.** Basis of Design: Characteristics of specific products manufactured by Cemco Steel Framing Systems, www.cemcosteel.com, are indicated to establish required level of quality and performance. The Architect will consider comparable products by alternate manufacturers listed in this Section, and requests for substitutions, under the provisions of Section 01 25 00.

- 2.1.1.1.** Acceptable Alternate Manufacturers: Dietrich, Clark-Western, or equal.

2.2. MATERIALS/DESIGN CRITERIA

- 2.2.1.** Base Metal Thickness Criteria: All metal framing materials provided as work of this Section shall comply with the following minimum thickness criteria for uncoated sheet steel. Thicknesses indicated are the minimum acceptable thickness for materials delivered to jobsite.

- 2.2.1.1.** Members designated as 20 gage (33 mil): 0.0329-inch

- 2.2.2.** Members designated as 16 gage (54 mil): 0.0538-inch

2.3. WALL STUDS / VERTICAL SURFACE FRAMING MATERIALS

- 2.3.1.** Type: Punched "C" studs, screwable, per ASTM C 955.

- 2.3.2.** Series: CS Series

- 2.3.3.** Characteristics:

- 2.3.3.1.** Size: Depth as shown on drawings, 1-5/8 inch flange with 1/2 inch return, unless noted otherwise.

- 2.3.3.2.** Base Metal:

- 2.3.3.2.1.** 20 gage members: ASTM A 653 Grade 33 sheet steel, $F_y = 33,000$ psi, galvanized to G60 coating class per ASTM A 653.

2.3.3.2.2. 16 gage members: ASTM A 653 Grade 50 sheet steel, $F_y = 50,000$ psi, galvanized to G60 coating class per ASTM A 653.

2.3.3.3. Top and bottom Track: Same gage and material as wall framing or 20 gage, whichever is more restrictive, 1-1/2 inch leg unless noted otherwise, width to suit stud width.

2.3.3.4. Deflection Track: provide Cemco Deflection Track, or a comparable product.

2.3.3.5. Bracing: 20 gage, unless otherwise indicated.

2.3.3.6. Stud Punch-Outs: minimum 10 inches between end of member and near edge of web punch-out and 24 inches on center thereafter, per ASTM C 955.

2.4. WALL FURRING MATERIALS

2.4.1. Manufacturer: Cemco or equal.

2.4.2. Type: Hat channel, screwable, ASTM C 645.

2.4.2.1. Series: 20 gage (33 mil) .

2.4.2.2. Size: *7/8 inch OR 1- 1/2 inch depth*, 1 1/2 inch nominal screw face width.

2.4.2.3. Base Metal: ASTM A 653 Grade 33 sheet steel, galvanized to G40 coating class per ASTM A 653.

2.4.3. Type: Z furring Channel, screwable, per ASTM C 645.

2.4.3.1. Series: 20 gage (33 mil).

2.4.3.2. Size: as shown on drawings for condition shown. minimum 7/8 inch leg.

2.4.3.3. Base Metal: ASTM A 653 Grade 33 sheet steel, galvanized to G40 coating class per ASTM A 653.

2.5. RESILIENT FURRING MATERIALS

2.5.1. Manufacturer: Cemco or equal.

2.5.2. Type: Unequal leg resilient sound attenuation channel, screwable, per ASTM C 645.

2.5.3. Series: RC-1, 25 gage (18 mil).

2.5.4. Characteristics:

2.5.4.1. Size: 1/2 inch depth, 2-1/4 inch nominal

2.5.4.2. Base Metal: ASTM A 653 Grade 33 sheet steel, galvanized to G40 coating class per ASTM A 653.

2.6. ACCESSORIES

2.6.1. Self drilling Screws, Bolts, Nuts and Washers: ASTM C 954, corrosion resistant.

- 2.6.2.** Metal Backing: 16 gage galvanized steel, as indicated on drawings, for attachment of wall mounted fixtures, equipment, cabinets, shelving, grab bars and handrails and other items not considered finish materials.
- 2.6.3.** Anchorage Devices:
 - 2.6.3.1.** Expansion anchors: Galvanized steel, size as indicated on drawings.
 - 2.6.3.2.** Concrete screw anchors: Galvanized steel, size as indicated on drawings.
 - 2.6.3.3.** Powder Actuated Fasteners: Size and type as indicated on drawings.
- 2.6.4.** Acoustic Sealant: As specified in Section 09 21 16.
- 2.6.5.** Fire-Resistive Sealant: As specified in Section 09 21 16 and 07 84 00..
- 2.6.6.** Fire Safing Insulation (where required): As specified in Section 09 21 16.
- 2.6.7.** Primer: FS TT-P-645, for touch-up of galvanized surfaces.
- 2.7.** FABRICATION
 - 2.7.1.** Fabricate assemblies of framed sections to sizes and profiles required; with framing members fitted, reinforced, and braced to suit design requirements.
 - 2.7.2.** Fit and assemble in largest practical sections for delivery to site, ready for installation.
- 2.8.** OTHER MATERIALS
 - 2.8.1.** Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.
- 3. PART 3 - EXECUTION**
 - 3.1.** SURFACE CONDITIONS
 - 3.1.1.** Inspection
 - 3.1.1.1.** Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
 - 3.1.1.2.** Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 - 3.1.1.3.** In the event of discrepancy, immediately notify the Architect.
 - 3.1.1.4.** Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.
 - 3.2.** PREPARATION
 - 3.2.1.** Where offset anchor plates are required, provide continuous plates fastened to building structure as shown on drawings.

3.2.2. Coordination and layout

- 3.2.2.1.** Verify stud spacing as required for compliance with all pertinent regulations to give proper support for the covering material, and as indicated on drawings.
- 3.2.2.2.** Carefully coordinate all requirements for backing support of items to be mounted on finished covering.
- 3.2.2.3.** Carefully coordinate all requirements for pipes and other items located within wall system, including punched opening dimension and alignment.

3.3. ERECTION

3.3.1. General

- 3.3.1.1.** Comply with ASTM C 754. In addition, comply with requirements defined in ASTM C 840 as applicable to steel framing application.
- 3.3.1.2.** Coordinate and provide bucks, blocking, blocking and backing plates as required for support of architectural, electrical, and mechanical work placed in or behind stud framing.
- 3.3.1.3.** Coordinate placement of insulation in multiple stud spaces made inaccessible after stud framing erection.
- 3.3.1.4.** Connect members with mechanical fasteners as shown on drawings, with screws penetrating joined members by not less than three exposed screw threads. Wire tying of framing members is not permitted.

3.3.2. Studs

- 3.3.2.1.** Connect studs to tracks using method called for on the drawings and as specified.
- 3.3.2.2.** Install studs so flanges within framing system point in same direction. Stud splicing is not acceptable.
- 3.3.2.3.** Construct corners using minimum three studs.
- 3.3.2.4.** Brace framing system and make rigid.
- 3.3.2.5.** Coordinate erection of studs with requirements of door and window frame supports and attachments.
- 3.3.2.6.** Align stud punched web openings.
- 3.3.2.7.** Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- 3.3.2.8.** Door Openings: Install two studs at each jamb, unless otherwise indicated. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3.3.2.9. Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

3.3.2.10. Curved Partitions: Bend track to uniform curve and locate straight lengths so they are tangent to arcs. Begin and end each arc with a stud, and space intermediate studs equally along arcs at maximum 16 inches on center.

3.3.3. Tracks

3.3.3.1. Align and secure top and bottom wall tracks to structure as shown on drawings.

3.3.3.2. Fit tracks under and above openings; secure intermediate studs at spacing of wall studs.

3.3.3.3. Maintain clearance under structural building members to avoid deflection transfer to studs.

3.4. TOLERANCES

3.4.1. Tolerances

3.4.1.1. Align all partition and wall assemblies to a tolerance of 1/8 inch in 10 feet deviation from line or plumb. Tolerances are not cumulative.

3.4.1.2. All corners and angles shall be as shown on plans to a tolerance of 1/8 inch in 2 feet-0 inches deviation from square or angle shown.

3.5. FIELD QUALITY CONTROL

3.5.1. Perform field inspection and testing under the provisions of Section 01 45 00.

3.5.1.1. Expansion Anchors: Provide pullout testing per testing schedule on Drawings.

END OF SECTION

SECTION 09 30 13

CERAMIC TILE

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Quarry tile.

1.1.2. Grout, Cleavage membranes, Thresholds and Transitions

1.2. REFERENCES

1.2.1. TCA (Tile Council of America) - Handbook for Ceramic Tile Installation.

1.3. SUBMITTALS

1.3.1. Samples

1.3.1.1. Submit four samples of specified colors and patterns of each tile, grout, and accessory units of the specified items.

1.3.1.2. Submit as an assembly in 24 inch square sample.

1.3.2. Materials List/Details: Accompanying samples, submit complete list of all proposed materials, including details of all joints between tile and adjoining materials.

1.3.3. Mock-up: Prior to beginning tile on typical floor surface, prepare in-place mock-up of portion of installation and obtain Architect's approval.

1.3.4. Certification

1.3.4.1. Prior to installation of tile in any one area, submit written certification to Architect certifying that surfaces are properly prepared for specified installation, and that all depressions and abutting edges are properly spaced and aligned to permit installation in pattern shown on drawings. See 3.1 below.

1.3.4.2. Submit certification that selected sealant specified in Section 07 90 00 will achieve manufacturer's published adhesion values on specified tile.

1.3.5. Slip Resistance Testing: Test six representative tile from each tile specified, selected at random from project stock per ASTM C1028 to verify compliance with slip resistance criteria.

1.4. QUALITY ASSURANCE

1.4.1. Conform to ANSI A137.1.

1.4.2. Conform to Tile Council of North America (TCNA) Handbook for Ceramic Tile Installation methods as defined in this Section.

1.5. QUALIFICATIONS

1.5.1. Manufacturer:

- 1.5.1.1.** Manufacturer shall have produced tile products of similar type for a period of five (5) years prior to beginning work of this section, and shall have the capability to produce the specified products to the delivery and quantity criteria of the project.

1.5.2. Staff

- 1.5.2.1.** Use only personnel thoroughly trained and experienced in the skills required, have installed similar applications of the specified products within one year prior to beginning work of this section, and are completely familiar with the manufacturers' recommended methods of installation as well as the requirements of this work.
- 1.5.2.2.** Staff installing specified grout shall have attended manufacturer's training sessions and have installed specified grout within the past 12 months prior to beginning work.

1.6. DELIVERY, STORAGE, AND HANDLING

- 1.6.1.** Deliver products to site under provisions of Section 01 60 00.

- 1.6.2.** Store and protect products under provisions of Section 01 60 00.

1.7. ENVIRONMENTAL REQUIREMENTS

- 1.7.1.** Do not install adhesives in a closed, unventilated environment.

- 1.7.2.** Maintain 50 degrees F during installation of mortar materials.

1.8. EXTRA STOCK

- 1.8.1.** Provide sufficient field tile of each type and color to cover ten square feet. In addition, provide ten cove base tile of each type and color.

- 1.8.2.** Package in clearly labeled containers, store as necessary until delivered to Owner.

2. PART 2 - PRODUCTS

2.1. CERAMIC TILE

- 2.1.1.** Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider *comparable products by alternate manufacturers where listed, and* requests for substitutions, under the provisions of Section 01 25 00.

- 2.1.1.1.** All tile for like applications shall be the product of a single manufacturer as indicated below.

2.2. INTERIOR QUARRY TILE - QT-1/QT-2

2.2.1. Manufacturer: Dal-Tile or equal.

2.2.2. Product Characteristics:

2.2.2.1. Series: Unglazed Quarry Tile, with quarry tile cove tile at all base conditions.

2.2.2.2. Size: Nominal 6 x 6 x 3/8 inch thick, with raised random slip resistant pattern at walking surface.

2.2.2.3. Color: As selected by Architect.

2.2.2.4. Accessory Tile: Provide sanitary cove and surfaced bullnose base.

2.2.2.5. Finish: Unglazed, raised slip resistant pattern.

2.2.2.5.1. QT-1: Unglazed, raised slip resistant pattern.

2.2.2.5.2. QT-2 Base: Unglazed, smooth texture.

2.2.2.5.3. Provide smooth surface quarry tile paver in color to match QT-1 under all kitchen equipment. Coordinate transition location with Architect.

2.2.2.6. Grout Joint: Nominal 1/4 inch, all joints equal.

2.2.2.7. Coefficient of Friction: minimum 0.80 per ASTM C1028 [wet and dry](#).

2.3. PORTLAND CEMENT BOND COAT

2.3.1. Mapei Ultra/Flex II www.mapei.com or equal, polymer-modified one-step mortar per ANSI A108.5 and A118.4.

2.4. GROUT

2.4.1. All grouts shall be produced by same manufacturer.

2.4.1.1. Sanded Grouts: Mapei Keracolor Floor or equal, with Mapei Plastijoints acrylic grout additive, complying with ANSI A118.6. Two separate colors as selected by Architect from Classic or Designer Series color line.

2.5. SEALERS AND FINISHES

2.5.1. Grout Sealer: Miracle Sealants 511 Impregnator, phone (800)-350-1901.

2.5.2. Slip Resistant Coating: Miracle Sealants 511 Impregnator, phone (800)-350-1901.

2.6. ACCESSORIES

2.6.1. Sealants:

2.6.1.1. Interior sealants: Unless noted otherwise, provide sealants as manufactured by grout manufacturer.

2.6.1.1.1. Where exposed to pedestrian traffic, provide sealants rated for pedestrian traffic, with minimum Shore A value of 35, as manufactured by grout manufacturer.

2.6.1.1.2. Match adjacent grout color.

2.6.2. Organic Adhesive: Type 1 organic adhesive, complying with ANSI A136.1 and approved by CTI for application.

2.6.3. Cleavage Membrane: Provide asphalt felt, ASTM D226, Type I (No. 15), or polyethylene sheet, ASTM D4397, 4.0 mils thick.

2.7. THRESHOLDS/TRANSITIONS

2.7.1. Tile Transitions: Provide Schluter, Reno-series, aluminum, as shown on drawings, height as required.

2.8. MORTAR AND GROUT MIXES

2.8.1. Mix and proportion cementitious materials for mortar and grout mixes in accordance with manufacturers requirements.

2.8.1.1. Do not mix more bond coat than can be used within one hour.

2.8.1.2. If bond coat mixture begins to skin, discard and make new batch.

2.9. ACCESSORY TILE

2.9.1. General

2.9.1.1. All accessory tile shall be in matching size, color, and finish.

2.9.1.2. Stretcher tile can be the standard size of the manufacturer.

2.9.1.3. Provide surface bullnose trim at all open edges or ends. Unglazed or cut tile edges unacceptable.

2.9.1.4. Provide surface bullnose trim at all tile abutting jamb conditions and extending beyond frame.

2.9.1.5. Provide full curved stretcher tile for all outside corners.

2.10. OTHER MATERIALS

2.10.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection:

3.1.1.1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

- 3.1.1.2.** Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 - 3.1.1.2.1.** Verify joints in concrete substrate occur only at sealant expansion joint locations as specified for ceramic tile.
 - 3.1.1.2.2.** Where non-documented substrate cracks occur, obtain direction from Architect.
- 3.1.1.3.** In the event of discrepancy, immediately notify the Architect.
- 3.1.1.4.** Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. MEMBRANE INSTALLATION

- 3.2.1.** Verify slab preparation complies with criteria specified in Section 03 30 00 / 03 30 10.
 - 3.2.1.1.** Remove all sealers, curing compounds and other materials affecting proper bond of membranes with bead blast abrasive equipment.
- 3.2.1.2.** Cleavage Membrane: Unless otherwise shown on drawings, where mortar bed is installed over concrete slab on grade at interior applications, provide specified cleavage membrane.
- 3.2.2.** Joint isolation membrane installation:
 - 3.2.2.1.** Install at all cracks in concrete slab substrates, control and expansion joints, and at all transitions between dissimilar materials.
 - 3.2.2.2.** Extend each side of crack or joint a minimum of 4 times diagonal tile dimension.
 - 3.2.2.3.** Apply using approved latex modified mortar system.
 - 3.2.2.4.** At expansion joints, continue sheet material in looped fashion through joint to accommodate anticipated joint movement.

3.3. TILE INSTALLATION

- 3.3.1.** Install tile and grout in accordance with manufacturer's instructions and TCNA Handbook methods as specified.
- 3.3.2.** Spread bond coat over area of installation using a notched trowel. Do NOT spread more bond coat than can be covered with tile within manufacturer's recommended time periods.
- 3.3.3.** Cut and fit tile tight to penetrations through tile. Form corners and bases neatly. Utilize bullnose trim shapes where tile terminates at dissimilar material in the same wall plane.
 - 3.3.3.1.** Use saw to cut tile fitting against curved surfaces or edges. Do not use nippers.
 - 3.3.3.2.** Use drill for all pipe or conduit penetrations. Do not split tile.

- 3.3.4.** Place tile joints in uniform width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.
- 3.3.5.** Sound tile after setting. Replace hollow sounding units.
 - 3.3.5.1.** Back-butter all exterior tile installations.
- 3.3.6.** Allow tile to set for a minimum of 48 hours prior to grouting, or as recommended by mortar manufacturer.
- 3.3.7.** Grout tile joints. Do not allow grout to harden on face of tile.
 - 3.3.7.1.** Install grout at abrasive grit tile using grout bag or grouting machines. Conventional sponge spread technique not acceptable.
 - 3.3.7.2.** Install sealant under the provisions of Section 07 90 00 and as specified.
- 3.3.8.** Kitchen Quarry Tile Installation:
 - 3.3.8.1.** Install floor tile at thinset areas per TCNA Method F113 and ANSI A108.5.
 - 3.3.8.2.** Grout all floor joints with specified sanded grout per ANSI A108.10.
- 3.3.9.** Installation of expansion and control joint assemblies.
 - 3.3.9.1.** Provide expansion joints complying with TCNA Detail EJ171 at the following specified locations:
 - 3.3.9.1.1.** At wall tile to paver/floor tile joints.
 - 3.3.9.1.2.** At all expansion and control joints in substrate. Where tile joint does not occur directly over substrate joint, provide sealant joint on each side of joint.
 - 3.3.9.1.3.** At tile joint at inside vertical corners.
 - 3.3.9.1.4.** At interior applications, at approximately 24 feet on center each way in floor and wall tile surfaces.
 - 3.3.9.1.5.** Where material transitions occur, comply with expansion/control joint criteria.
 - 3.3.9.1.6.** At conditions where tile extends through doorways, extend wall cove/floor tile sealant joint across doorway.
 - 3.3.9.1.7.** At column penetrations, tile terminations against frames and other restraining elements.
 - 3.3.9.1.8.** At tile terminations against curbs, paving or other restraining elements.

3.4. CLEANING

- 3.4.1.** Clean work under provisions of Section 01 77 19.
- 3.4.2.** Clean tile surfaces in accordance with the tile and grout manufacturer's instructions; remove all traces of grout scum.

- 3.4.3.** Do not use muriatic acid compounds.
- 3.4.4.** Do not allow traffic on tile for a minimum of 72 hours after installation.
- 3.4.5.** Provide damp cure of all installations per manufacturer's recommendations and per ANSI A108.
 - 3.4.5.1.** Do not damp cure latex modified grout systems unless recommended by manufacturer.
- 3.4.6.** Sealing
 - 3.4.6.1.** Seal all interior toilet floor, base, and wall ceramic tile applications.
 - 3.4.6.1.1.** Do not seal epoxy grout applications.
 - 3.4.6.2.** Seal per manufacturer's recommendations.
- 3.5. PROTECTION**
 - 3.5.1.** Protect finished installation under provisions of Section 01 50 00.
 - 3.5.2.** Provide non-staining protective coverings for all tile in traffic area.
 - 3.5.3.** Remove and replace any products that are cracked, scraped, or otherwise damaged after installation and before acceptance by Owner.
- 3.6. FIELD QUALITY CONTROL**
 - 3.6.1. Tolerances**
 - 3.6.1.1.** Grout joint alignment with adjacent edge: 1/8" in 10 feet.
 - 3.6.1.2.** Row and column alignment: 1/8" in 10 feet deviation.
 - 3.6.1.3.** Alignment with adjacent tile: 1/16" +/-.
 - 3.6.1.4.** Level, plane and/or vertical: 1/8" in 10 feet deviation.

END OF SECTION

SECTION 09 51 00
ACOUSTICAL CEILINGS

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Suspended metal grid ceiling system.
- 1.1.2.** Acoustical panels.
- 1.1.3.** Perimeter trim.

1.2. REFERENCES

- 1.2.1.** ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
- 1.2.2.** ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
- 1.2.3.** ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
- 1.2.4.** ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
- 1.2.5.** ASTM E 1264 Classification for Acoustical Ceiling Products.

1.3. SYSTEM DESCRIPTION

- 1.4.** Installed System: Conform to ASTM C635 and C636. **QUALITY ASSURANCE**
- 1.4.1.** Installer: Company with three years minimum documented experience.

1.5. SUBMITTALS

- 1.5.1.** Provide submittals under provisions of Section 01 33 00.
- 1.5.2.** Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.
- 1.5.3.** Samples: Minimum 6 inch x 6 inch samples of specified acoustical panel; 8 inch long samples of exposed wall molding and suspension system, including main runner and 4 foot cross tees.
- 1.5.4.** Shop Drawings: Indicate on shop drawings, grid layout and related dimensioning, junctions with other work or ceiling finishes, interrelation of mechanical and electrical items related to system, and complete suspension system details. Layout and details of acoustical ceilings. Show items coordinated with, or supported by the ceilings.

- 1.5.5.** Certifications: Provide manufacturer's certification of compliance with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.

1.6. ENVIRONMENTAL REQUIREMENTS

- 1.6.1.** Do not install interior ceilings until space is enclosed and weatherproof; wet work in place is completed and nominally dry; work above ceilings is complete; and ambient conditions of temperature and humidity are continuously maintained at values near those intended for final occupancy.
- 1.6.2.** Building areas to receive ceilings shall be free of construction dust and debris

1.7. SEQUENCING/SCHEDULING

- 1.7.1.** Do not install acoustical ceilings until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- 1.7.2.** Schedule installation of acoustic units after interior wet work is dry.

1.8. WARRANTY

- 1.8.1.** Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace acoustical panels that fail within the warranty period. Failures include, but are not limited to:
 - 1.8.1.1.** Acoustical Panels: Sagging and warping as a result of defects in materials or factory workmanship.
 - 1.8.1.2.** Grid System: Rusting and manufacturer's defects
 - 1.8.1.3.** Acoustical Panels with BioBlock Plus or designated as inherently resistive to the growth of micro-organisms installed with Armstrong suspension systems exhibiting growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.
- 1.8.2.** Warranty Period:
 - 1.8.2.1.** Acoustical panels: Ten (10) year from date of substantial completion.
 - 1.8.2.2.** Grid: Ten years from date of substantial completion.

1.9. EXTRA STOCK

- 1.9.1.** Provide extra quantity of acoustic units under provisions of Section 01 77 19.
- 1.9.2.** Acoustical Panel: Provide two (2) unopened boxes of each type of acoustical panel.

2. PART 2 - PRODUCTS

2.1. MANUFACTURERS

- 2.1.1.** Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. CEILING SUSPENSION SYSTEM

- 2.2.1.** Manufacturer: Armstrong World Industries, Inc., www.armstrong.com.
- 2.2.2.** Series: Prelude XL
 - 2.2.2.1.** Main Runner: 7301
 - 2.2.2.2.** Cross Runners: As required for condition and seismic compliance.
 - 2.2.2.3.** Face Dimension: 15/16 inches.
 - 2.2.2.4.** Edge moldings: "Shadowline" custom 1/2-inch wide reveal molding as shown on drawings, with prefabricated inside and outside corner caps.
- 2.2.3.** Duty Rating: Heavy Duty per ASTM C635.
 - 2.2.3.1.** Support/Fastening System: Components of size and type as shown in the drawings as required to rigidly secure acoustic ceiling system with maximum deflection of 1/360. Use perimeter attachment clips as required to allow 3/4 inch movement and retain the panel in place.
- 2.2.4.** Code Compliance: Comply with applicable portions of ICC ESR 1289, ESR 1308.
- 2.2.5.** Fire Resistance Rating: Non-rated assembly.
- 2.2.6.** Color: Painted finish, as selected from standard line.

2.3. CEILING SUSPENSION SYSTEM TRIM

- 2.3.1.** Manufacturer: Armstrong World Industries, Inc., www.armstrong.com.
- 2.3.2.** Series: Prelude XL 15/16" Exposed Tee
 - 2.3.2.1.** Dimension: 1-11/16" height, as shown on drawings.
 - 2.3.2.2.** Outside Corners: prefabricated inside and outside corner caps.
 - 2.3.2.3.** Suspension and Attachment Accessories: provide all required hanging, splice, and attachment components. Provide touch up paint for field finishing.
- 2.3.3.** Code Compliance: Comply with applicable portions of ICC ESR 1289 and 1308.
- 2.3.4.** Fire Resistance Rating: Non-rated assembly.
 - 2.3.4.1.** Color: Factory finish, as selected from full range of "standard finishes".

2.4. ACOUSTIC PANELS – HIGH ACOUSTICAL VALUE: ACP-1

- 2.4.1.** Manufacturer: Armstrong World Industries, www.armstrong.com.
- 2.4.2.** Series: Cirrus
 - 2.4.2.1.** Style: Cirrus Tile & Lay in #53HRC.
 - 2.4.2.2.** Edge: Tegal edge.

2.4.2.3. Size: 24 x 48 x 3/4 inch.

2.4.3. Fire/Habitability Criteria:

2.4.3.1. Fire Resistance Rating: Class A per ASTM E1264, maximum Flame Spread of 25, maximum smoke contributed of 450, UL Labeled

2.4.3.2. Noise Reduction: NRC range of .70.

2.4.3.3. Light Reflectance: LR-1 (Minimum 0.80).

2.4.3.4. Humidity Resistance: Provide manufacturer's Standard.

2.4.3.5. Antimicrobial Resistance: Inherent in panel composition.

2.4.4. Finish: Factory applied paint.

2.4.5. Color: White.

2.5. ACOUSTIC PANELS: ACP-2

2.5.1. Manufacturer: Armstrong World Industries, www.armstrong.com. or equal.

2.5.2. Series: Cortega

2.5.2.1. Style: Cortega 703B

2.5.2.2. Edge: 15/16" Angled Tegalur

2.5.2.3. Size: 24 x 48 x 5/8 inch.

2.5.3. Fire/Habitability Criteria:

2.5.3.1. Fire Resistance Rating: Class A per ASTM E1264, maximum Flame Spread of 25, maximum smoke contributed of 450, UL Labeled

2.5.3.2. Noise Reduction: NRC range of 0.55.

2.5.3.3. Light Reflectance: LR-1 (Minimum 0.80).

2.5.3.4. Humidity Resistance: Provide manufacturer's Standard

2.5.3.5. Antimicrobial Resistance: Provide manufacturer's Standard

2.5.4. Finish: Factory applied paint.

2.5.5. Color: White.

2.6. OTHER MATERIALS

2.6.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

- 3.1.1.1.** Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
- 3.1.1.2.** Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 - 3.1.1.2.1.** Verify hanger layout will not interfere with other work.
- 3.1.1.3.** In the event of discrepancy, immediately notify the Architect.
- 3.1.1.4.** Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. CEILING GRID INSTALLATION

- 3.2.1.** Install system capable of supporting imposed loads to a deflection of 1/360 maximum.
- 3.2.2.** Install after major above ceiling work is complete. Coordinate the location of hangers with other work.
- 3.2.3.** Crimp or tightly twist wire ends around wire support. Do not leave ends angled away from line of wire support.
- 3.2.4.** Install after major above ceiling work is complete. Coordinate the location of hangers with other work.
- 3.2.5.** Where ducts or other equipment prevent the regular spacing of hangers, install independent framing below ductwork or equipment from which hangers may be attached. Hangers are prohibited from being attached to any non structural building element.
- 3.2.6.** Locate system on room axis leaving equal border units according to reflected ceiling plan.
- 3.2.7.** Install edge molding at intersection of ceiling and vertical surfaces, using longest practical lengths. Miter corners. Provide edge moldings at junctions with other interruptions. Where round obstructions occur, provide preformed closers to match edge molding.

3.3. ACOUSTIC UNIT INSTALLATION

- 3.3.1.** Install acoustic units level, in uniform plane, and free from twist, warp and dents.
- 3.3.2.** Install panels in accordance with the manufacturer's instructions, and in compliance with ASTM C 636 and with the authorities having jurisdiction.
- 3.3.3.** Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.

- 3.3.4.** For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces. Field paint field cut edges exposed to view.

3.4. ADJUSTING AND CLEANING

- 3.4.1.** Replace damaged and broken panels.

- 3.4.2.** Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage.

- 3.4.2.1.** Where approved by Architect, touch up paint may be used to hide minor scratches and nicks in the surface.

- 3.4.3.** Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.5. TOLERANCES

- 3.5.1.** Variation from Flat and Level Surface: 1/8 inch in 10 feet.

END OF SECTION

SECTION 09 60 10

CONCRETE SLAB MOISTURE CONTROL COATING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Concrete floor moisture emission testing.
- 1.1.2.** Concrete floor preparation.
- 1.1.3.** Water vapor and alkalinity control system at all concrete floors receiving finish flooring products.

1.2. REFERENCES

- 1.2.1.** ASTM D 4541-02 – Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
- 1.2.2.** ASTM E 96 – Standard Test Methods for Water Vapor Transmission of Materials.
- 1.2.3.** ASTM F 710-05 – Practice for Preparing Concrete Floors to Receive Resilient Flooring.
- 1.2.4.** ASTM F 1869-04 – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

1.3. QUALIFICATIONS

1.3.1. System Manufacturer

- 1.3.1.1.** Company specializing in manufacturing the type of products specified in this Section with minimum 5 years experience in materials of like design and application.
- 1.3.1.2.** Representative Projects: System manufacturer shall have installed water vapor reduction systems in a minimum of ten (10) projects of similar scope and complexity over the past five years.
- 1.3.1.3.** Representative Projects: Manufacturer shall provide a list of at least ten (10) projects, certifying successful management of water vapor emission levels of 10 pounds or more for a minimum period of five years.

1.3.2. Installer:

- 1.3.2.1.** Installer: Company specializing in applying manufacturers systems with manufacturers water vapor reduction systems in a minimum of ten (10) projects of similar scope and complexity over the past five years.
- 1.3.2.2.** Installer: Company approved by system materials manufacturer for specified guarantee.
- 1.3.2.3.** Installing Foreman: Individual specializing in applying manufacturers water vapor reduction systems in a minimum of ten (10) projects of similar scope and complexity over the past five years.

1.4. SUBMITTALS

- 1.4.1.** Provide submittals under provisions of Section 01 33 00.
- 1.4.2.** Submit shop drawings indicating procedure for treating joints and cracks in concrete.
- 1.4.3.** Submit product data for system and accessories, including test data indicating compliance with specified criteria.
- 1.4.4.** Submit moisture level test data complying with specified procedures and schedule.
- 1.4.5.** Submit manufacturers and installers qualifications in compliance with this Section.
- 1.4.6.** Submit vapor control system manufacturers representative's written approval of selected finish flooring materials, adhesives and installation methods.
- 1.4.7.** Following installation, submit vapor control system manufacturers representative's written report regarding substrate review and initial installation methods, stating manufacturers approval of substrate and methods.
- 1.4.8.** Submit finish flooring manufacturers representative's written approval of compatibility with finish flooring materials, adhesives and installation methods, including requirements for cementitious topcoats.
- 1.4.9.** Submit manufacturers certificate of liability insurance by product liability insurance carrier, with minimum "A" rating from Best or equivalent rating system, in the amount of \$5,000,000 per occurrence, and naming the Owner, Architect and General Contractor as co-insured.

1.5. WARRANTY

- 1.5.1.** Provide manufacturers standard, non-prorated written warranty against both material defects and improper installation and complying with the following criteria.
- 1.5.2.** Warranty coverage and exclusions:
 - 1.5.2.1.** Coverage shall protect against delamination of flooring from substrate as a result of moisture vapor penetration or chemical reaction.
 - 1.5.2.2.** Coverage may exclude failure due to flooding of floor, seismic damage occurring after installation, water intrusion due to plumbing leaks.
 - 1.5.2.3.** Coverage shall not exclude coverage for
 - 1.5.2.3.1.** Concrete shrinkage cracks after application.
 - 1.5.2.3.2.** Non-compatibility with specified admixtures.
 - 1.5.2.3.3.** Concrete silicates or resin treatments.
 - 1.5.2.3.4.** ACI 201 limitations.
- 1.5.3.** Term: Minimum fifteen (15) years or the life of the flooring material, whichever comes first.
- 1.5.4.** Warranty Remedy at no cost to Owner:

1.5.4.1. Replacement of finish flooring material, including removal, materials, labor and all related accessories.

1.5.4.2. Repair or replacement of moisture vapor control system.

1.6. DELIVERY, STORAGE, AND HANDLING

1.6.1. Deliver products to site under provisions of the General Conditions.

1.6.2. Store and protect products under provisions of the General Conditions.

1.6.3. Store materials in a dry, secure area.

1.6.4. Maintain minimum ambient temperature of 65 degrees F.

1.7. ENVIRONMENTAL REQUIREMENTS

1.7.1. Do not install system when concrete surface temperatures are below 45 degrees F or above 85 degrees F.

1.7.2. Restrict pedestrian traffic from area where system is installed for a period of 12 hours and other traffic for a period of 36 hours after installation.

2. PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. MOISTURE VAPOR CONTROL SYSTEM

2.2.1. Manufacturer: Floor Seal Technology., www.floorseal.com, or equal.

2.2.2. Type: Two-component, low viscosity resin treatment system with elastomeric properties designed to expand and contract with limited slab movement.

2.2.3. Series: MES 100.

2.2.3.1. Provide system compatible with epoxy/resinous finish flooring where occurs.

2.2.4. System Performance:

2.2.4.1. Moisture Vapor Emission Limit: System capable of reducing emission levels up to and including 20.0 pounds per 1,000 square feet of floor area to a maximum of 3.0 pounds per 1,000 square feet.

2.2.4.2. Alkalinity Level: System suitable for installation on slabs exhibiting pH values up to and including 14.

2.2.5. Fire/Life Safety/Habitability Criteria

2.2.5.1. Flammability: Provide non-flammable products.

2.2.5.2. Hazard Rating: Materials used shall be rated non-hazardous under OSHA regulations.

2.2.5.3. Air Quality Compliance: All products used shall comply with local and federal VOC criteria.

2.2.6. Accessory Products

2.2.6.1. Joint Detailing and Patching: Provide materials as recommended by manufacturer for application.

2.2.6.2. Cementitious Topcoat: Provide Ardex K-15 by Ardex Engineered Cements, Inc, 100 percent Portland cement based topcoat system or equal as recommended by moisture control system manufacturer and per approved submittal. Use of gypsum or asphalt based systems are not permitted.

2.3. OTHER MATERIALS

2.3.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.2.1. Verify measured moisture content is within floor sealer and finish flooring material manufacturers acceptable range.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. TESTING PROCEDURES

3.2.1. Moisture and alkalinity testing

3.2.1.1. Coordinate with moisture testing specified in other Sections.

3.2.1.2. Where values resulting from second set of tests exceed three pounds per 1000 square feet over a 24 hour period, provide vapor control system specified in this Section.

3.2.1.3. Where values resulting from second set of tests do not exceed three pounds per 1000 square feet over a 24 hour period, and at Owners sole discretion, a deductive change order contract adjustment will be made for slab areas not treated.

3.3. SLAB PREPARATION

3.3.1. Prepare Concrete Slab Surface.

- 3.3.1.1.** Shotblast or scarify substrates to degree of "roughness" as required by system manufacturer.
- 3.3.1.2.** Acid etching and grinding is not acceptable.
- 3.3.1.3.** Protect adjacent surfaces prior to beginning slab preparations.

3.3.2. Crack and joint preparation

- 3.3.2.1.** Following slab shotblasting, rout out all divots, gouges, cracks, expansion joints and control joints in profile as recommended by floor sealer system manufacturer.
- 3.3.2.2.** Vacuum clean all prepared joints.
- 3.3.2.3.** Fill all joints and seal all floor penetrations such as plumbing piping with manufacturer's urethane sealant.

3.4. FLOOR SEALER SYSTEM INSTALLATION

- 3.4.1.** Clean all floors and apply system in accordance with system manufacturer's instructions and recommendations.
- 3.4.2.** Apply system at coverage rate as recommended by manufacturer. Allow to cure, using ventilation systems as required to accelerate system curing.
- 3.4.3.** Apply cementitious topcoat as required to provide a smooth surface suitable for finish flooring installation. Allow to cure a minimum of 24 hours before installation of finish flooring.

3.5. QUALITY CONTROL TESTING PROCEDURES

3.5.1. Moisture Testing

- 3.5.1.1.** Following completion of floor sealer system installation, conduct anhydrous calcium chloride testing using prepackaged kit systems approved by flooring manufacturer. Post-application testing per ASTM F1869 may begin 10 days after installation.
- 3.5.1.2.** Provide minimum 3 tests per 1,000 square feet or less, 6 tests for areas 1,000 to 2,000 square feet, with one additional test for each 1,000 square feet in excess of 2,000 square feet. Submit test results to Architect prior to beginning flooring installation.

Alkalinity Testing

- 3.5.2.1.** Conduct alkalinity testing of slab surface immediately following removal of calcium chloride test kit, in accordance with ASTM F 710 procedure.
- 3.5.3.** Submit testing data, including test location mapping, to Architect prior to beginning flooring installation.

- 3.5.4.** Replacement/Repair: Where test results show values in excess of specified limits, repair or replace system as required to comply with specified criteria at no additional cost to Owner.

3.6. PROTECTION

- 3.6.1.** Protect finished installation under provisions of the General Conditions.

END OF SECTION

SECTION 09 65 00
RESILIENT FLOORING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Resilient tile flooring.

1.1.2. Resilient base.

1.2. REFERENCES

1.2.1. ASTM D 2047 – Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine

1.2.2. ASTM D 4541-02 – Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.

1.2.3. ASTM E 84 - Surface Burning Characteristics of Building Materials.

1.2.4. ASTM E 96 – Standard Test Methods for Water Vapor Transmission of Materials.

1.2.5. ASTM E 648 – Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source

1.2.6. ASTM E 662 – Specific Optical Density of Smoke Generated by Solid Materials

1.2.7. ASTM F 1861– Standard Specification for Resilient Wall Base

1.2.8. ASTM F 710-05 – Practice for Preparing Concrete Floors to Receive Resilient Flooring.

1.2.9. ASTM F 1869-04 – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

1.3. QUALIFICATIONS

1.3.1. Applicator: Company specializing in flooring systems with 5 years documented experience, trained and approved by the flooring system manufacturer.

1.4. SUBMITTALS

1.4.1. Provide submittals under provisions of Section 01 33 00.

1.4.2. Product data

1.4.2.1. Submit product data for flooring materials and accessories.

1.4.2.2. Submit manufacturer's installation instructions.

1.4.3. Shop drawings.

1.4.3.1. Submit shop drawings indicating layout and dimensions for all seams and penetrations, including details of flooring termination and transitions.

1.4.3.2. Provide typical detail of inside/outside corner installation of resilient base.

1.4.4. Samples:

1.4.4.1. Submit four samples, 8x11 inches in size, illustrating color and pattern for each floor material specified.

1.4.4.2. Submit four 11 inch long samples of base material for each color specified.

1.4.4.3. Submit three samples, 6 inches long by height as required, showing resilient flooring flash cove and termination method.

1.4.5. Submit factory representative's report regarding substrate review and initial installation methods, stating manufacturers approval of substrate and methods.

1.4.6. Submit moisture test results on concrete substrate, including location mapping coordinated with floor plan and room designations.

1.5. OPERATION AND MAINTENANCE DATA

1.5.1. Submit cleaning and maintenance data under provisions of Section 01 77 19.

1.6. ENVIRONMENTAL REQUIREMENTS

1.6.1. Store materials for three days prior to installation in area of installation to achieve temperature stability.

1.6.2. Maintain ambient temperature required by adhesive manufacturer three days prior to, during, and 24 hours after installation of materials.

1.7. EXTRA STOCK

1.7.1. Flooring: Provide one box of each color and style of selected flooring in unopened box, from same run as installation.

1.7.2. Base: Provide 20 linear feet of base, in each color and style selected, with 5 each matching outside and inside corners, from same run as installation.

2. PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. RESILIENT TILE

2.2.1. Manufacturer: Armstrong World Industries, Inc., <http://www.commercial-floors.com/>.

2.2.2. Series: Standard Excelon series.

2.2.3. Size/Gage: 12 inch square, 1/8 inch gage.

2.2.4. Fire Resistivity/Habitability Criteria:

2.2.4.1. Critical Radiant Flux: Minimum 0.45 watts/cm² per ASTM E648.

2.2.4.2. NBS Smoke Rating: maximum 450 per ASTM E662.

2.2.4.3. Slip Resistance: Greater than 0.60 per ASTM D2047.

2.2.5. Color: Taupe # 51901.

2.3. RESILIENT BASE MATERIALS: TYPE RB-1

2.3.1. Manufacturer: Roppe Corp., www.roppe.com.

2.3.2. Type: thermoset, extruded, vulcanized rubber.

2.3.2.1. Material Standard: Comply with ASTM F 1861, Type TS, Group 1 (Solid).

2.3.3. Series: Pinnacle

2.3.3.1. Coved Toe.

2.3.3.2. Accessories: Provide premolded inside and outside corners matching base profile.

2.3.4. Size: 4 inch high x coil stock lengths.

2.3.5. Fire Resistivity/Habitability Criteria:

2.3.5.1. Fire Resistivity Rating: Class C per ASTM E84.

2.3.5.2. Smoke Density Rating: maximum 450 per ASTM E84.

2.3.6. Color: Fig # P125.

2.4. REDUCERS/EDGE STRIPS

Provide Roppe, style to fit job conditions and as approved by the Architect, color as selected from complete line.

2.5. ACCESSORY MATERIALS

2.5.1. Subfloor Filler: Portland cement based, Ardex, <http://www.ardex.com/>, or equal, type recommended by flooring material manufacturer. Use of gypsum based filler is prohibited.

2.5.2. Adhesives shall be approved by the flooring manufacturer prior to Product DATA submittal

2.5.3. Adhesive: Provide W.F. Taylor [<http://www.wftaylor.com/>] or equal, Envirotec, (800)986-3888, low VOC adhesive, Series as recommended by manufacturer. Adhesive VOC emissions shall not exceed maximum 0.60 mg/square meter/hour after 24 hours per EPA D.E.C. Testing method. Confirm adhesive compatibility with resilient flooring manufacturer prior to installation.

2.6. OTHER MATERIALS

2.6.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

- 3.1.1.1.** Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
- 3.1.1.2.** Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 - 3.1.1.2.1.** Verify that surfaces comply with specified tolerances.
 - 3.1.1.2.2.** Verify concrete floors comply with specified moisture content criteria acceptable to the flooring manufacturer, and do not exhibit negative alkalinity, carbonization, or dusting.
- 3.1.1.3.** In the event of discrepancy, immediately notify the Architect.
- 3.1.1.4.** Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

3.2.1. Moisture and alkalinity testing

- 3.2.1.1.** Conduct alkalinity and anhydrous calcium chloride testing using prepackaged kit systems approved by flooring manufacturer.
- 3.2.1.2.** Provide test at coverage rate required by flooring manufacturer, with minimum of 3 tests/first 1,000 square feet and 1 test per each 1,000 square feet after. Distribute uniformly throughout building. Prepare map or diagram of test locations in each building.
- 3.2.1.3.** Conduct one set of tests 60 days prior to scheduled flooring installation. Submit test results to Architect within 48 hours of test receipt.
- 3.2.1.4.** Conduct second set of tests 14 days prior to scheduled flooring installation. Submit test results to Architect within 48 hours of test receipt.

3.2.2. Alkalinity Testing

- 3.2.2.1.** Conduct alkalinity testing of slab surface immediately following removal of calcium chloride test kit, in accordance with ASTM F 710 procedure.

3.2.3. Submit testing data, including test location mapping, to Architect prior to beginning flooring installation.

3.2.4. Evaluate existing floor surface. Prepare surface and apply underlayment to all floor surfaces exhibiting the following characteristics:

- 3.2.4.1.** Cracks, gouges or holes exceeding 1/16 inch in any dimension.
- 3.2.4.2.** Cracks with adjacent surfaces exceeding 1/16 inch in height.

- RESILIENT FLOORING
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- 3.5.2.** Remove excess adhesive from floor, base, and wall surfaces without damage.
- 3.5.3.** Clean floor and base surfaces and buff floor without use of waxes or sealers in accordance with manufacturer's instructions.

END OF SECTION

SECTION 09 68 00

CARPETING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Carpeting, direct glue application.

1.1.2. Accessories.

1.2. REFERENCES

1.2.1. ASTM D 1335 – Tuft Bind of Pile Floor Coverings.

1.2.2. ASTM E 84 - Surface Burning Characteristics of Building Materials.

1.2.3. ASTM E 648 – Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.

1.2.4. ASTM E 662 – Specific Optical Density of Smoke Generated by Solid Materials.

1.2.5. Carpet and Rug Institute – CRI-104, Standard for Installation of Commercial Carpet.

1.3. SUBMITTALS

1.3.1. Submit shop drawings and product data under provisions of Section 01 33 00.

1.3.2. Submit written certification of compliance with manufacturer's and installer's qualification requirements specified, including listing of compliant installations.

1.3.3. Submit product data for flooring materials and accessories.

1.3.4. Shop drawings.

1.3.4.1. Submit shop drawings indicating layout and dimensions for all seams and penetrations, including details of flooring termination and transitions.

1.3.4.2. Provide method of joining seams and direction of carpet.

1.3.5. Samples:

1.3.5.1. Submit four samples, 8x11 inches in size, illustrating color and pattern for each floor material specified.

1.3.5.1.1. Texture, color range and appearance of substituted products shall be as close as possible to that specified, as determined solely by the Architect.

1.3.5.1.2. Substituted products shall be manufacturers running line goods. "Knock-offs" or custom runs will not be accepted.

1.3.6. Submit manufacturer's installation instructions.

- 1.3.7.** Submit factory representative's report regarding substrate review and initial installation methods, stating manufacturers approval of substrate and methods.
- 1.3.8.** Submit moisture test results on concrete substrate, including location mapping coordinated with floor plan and room designations.

1.4. QUALITY ASSURANCE

1.4.1. Manufacturer:

- 1.4.1.1.** Company with minimum of ten years documented history of producing carpeting complying with the performance criteria of this Section.
- 1.4.1.2.** Company with minimum of ten California installations in use for a minimum of five years using carpeting complying with the performance criteria of this Section.

1.4.2. Installer: Company with 5 years minimum documented experience installing carpet products.

1.5. OPERATION AND MAINTENANCE DATA

- 1.5.1.** Submit operation and maintenance data under provisions of Section 01 77 19.
- 1.5.2.** Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning and shampooing.

1.6. ENVIRONMENTAL REQUIREMENTS

- 1.6.1.** Store materials for three days prior to installation in area of installation to achieve temperature stability.
- 1.6.2.** Maintain minimum 70 degrees F ambient temperature three days prior to, during, and 24 hours after installation of materials.

1.7. WARRANTY

- 1.7.1.** Provide manufacturers standard, printed non pro-rated warranty against the following defects for the stated period after acceptance of installation:
 - 1.7.1.1.** Edge Ravel: No edge ravel based on normal use, wet and dry condition of use, and without use of seam sealers for a period of 15 years.
 - 1.7.1.2.** Secondary Back Adhesion: No delamination based on normal use for the life of the installation.
 - 1.7.1.3.** Tuft Bind: Average 20 pound average tuft bind value based on normal use, wet and dry condition of use, per ASTM D1335 for a period of 15 years.
 - 1.7.1.4.** Excessive Resiliency Loss, defined as exceeding 10 percent reduction in average carpet backing thickness over warranty period.
 - 1.7.1.5.** Excessive Static Electricity, defined as exceeding 3.0 Kilovolts at 20% RH and 70 degrees F per AATCC 134.
 - 1.7.1.6.** *Manufacturers published warranty for stain release.*

1.7.1.7. *Manufacturers published warranty for colorfastness.*

1.7.2. Use of chair pads shall not be a pre-condition for warranty coverage

1.7.3. Carpeting exhibiting defects as defined shall be replaced or repaired by the manufacturer. Secondary warranties involving those other than the manufacturer are not acceptable.

1.8. CONTRACTORS GUARANTY

1.8.1. Provide guaranty, in Architect approved form, against the following defects for a period of 5 years after acceptance of installation:

1.8.1.1. Doming, wrinkling or delamination from substrate.

1.8.1.2. Separation, lifting, puckering or other seam defects.

1.8.1.3. Loose yarn tufts, strays or other yarn pieces at seams or edges.

1.9. EXTRA MATERIALS

1.9.1. Provide 15 square yards of carpeting of each color specified, under provisions of Section 01 77 19.

2. PART 2 - PRODUCTS

2.1. CARPET – CPT-1

2.1.1. Basis of Design: Characteristics of specific products manufactured by Lees Commercial Carpets, <http://www.leescarpets.com/>, are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.1.2. Type: Tufted, Broadloom, tufted loop pile.

2.1.3. Series/Style: Faculty IV.

2.1.4. Construction:

2.1.4.1. Gauge/stitch count: 1/8 inch / 8.3 stitches per inch.

2.1.4.2. Pile Yarn Weight: 26 oz face weight, per square yard.

2.1.4.3. Total Weight: 76.6 oz

2.1.4.4. Pile Height: 0.125 - .203 inch, .145" average

2.1.4.5. Yarn Type: Antron Type 6.6, Environmentally Preferred Product Antron Legacy Nylon by Invista, with static control, yarn dyed.

2.1.5. Backing:

2.1.5.1. Primary: Woven Polypropylene.

2.1.5.2. Secondary: Unibond thermoplastic backing system.

2.1.6. Fire/Habitability Criteria

2.1.6.1. Critical Radiant Flux: Class 1 - Minimum 0.45 w/sq cm per ASTM E648, (Class 1 per CBC Section 804.4.1).

2.1.6.2. Smoke Density: 450 or less, per ASTM E 84 or ASTM E 662.

2.1.6.3. Static Propensity: 3.0 KV or less per AATCC 134.

2.1.7. Color: three separate colors, approximately equal percentage in project, and as selected by Architect from standard color line.

2.2. CARPET - CPT -2

2.2.1. Basis of Design: Characteristics of specific products manufactured by Lees Commercial Carpets, <http://www.leescarpets.com/>, are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2.2. Type: Tufted, Broadloom, textured loop graphic.

2.2.3. Series/Style: SisalCraft II.

2.2.4. Construction:

2.2.4.1. Gauge/stitch count: 1/10 inch / 8.9 stitches per inch.

2.2.4.2. Pile Yarn Weight: 24 oz face weight, per square yard.

2.2.4.3. Pile Height: 0.136 inch average

2.2.4.4. Yarn Type: Dupont Type 6.6, Environmentally Preferred Product Antron Legacy Nylon by Invista, with static control, yarn dyed.

2.2.5. Backing:

2.2.5.1. Primary: Woven Polypropylene.

2.2.5.2. Secondary: Unibond thermoplastic backing system.

2.2.6. Fire/Habitability Criteria

2.2.6.1. Critical Radiant Flux: Class 1 - Minimum 0.45 w/sq cm per ASTM E648, (Class 1 per CBC Section 804.4.1).

2.2.6.2. Smoke Density: 450 or less, per ASTM E 84 or ASTM E 662.

2.2.6.3. Static Propensity: 3.0 KV or less per AATCC 134.

2.2.7. Color: As selected by Architect from standard color line.

2.3. CARPET – CPT-3

2.3.1. Manufacturer: Atlas Carpet Mills,. www.atlascarpetmills.com.

2.3.2. Type: Broadloom, tufted interloop,.

- 2.3.3.** Series/Style: Ibiza.
- 2.3.4.** Construction:
 - 2.3.4.1.** Gauge/stitch count: 5/64 inch.
 - 2.3.4.2.** Pile Yarn Weight: 26 oz face weight per square yard.
 - 2.3.4.3.** Total finished weight: 56 oz per square yard.
 - 2.3.4.4.** Pile Height: 0.154 inch. (average finished pile height)
 - 2.3.4.5.** Density: 6,077.
 - 2.3.4.6.** Yarn Type: Antron Lumena solution dyed Type 6,6.
- 2.3.5.** Backing:
 - 2.3.5.1.** Primary: Woven Polypropylene.
 - 2.3.5.2.** Secondary: Permian Bac MP.
 - 2.3.5.3.** Static Protection: Provide integral static control.
- 2.3.6.** Fire/Habitability Criteria
 - 2.3.6.1.** Critical Radiant Flux: Class 1 - Minimum 0.45 w/sq cm per ASTM E648, (Class 1 per CBC Section 804.4.1).
 - 2.3.6.2.** Smoke Density: 450 or less, per ASTM E 84 or ASTM E 662.
 - 2.3.6.3.** Static Propensity: 3.5 KV or less per AATCC 134.
- 2.3.7.** Treatment: Provide factory applied Duratech anti-soiling treatment.
- 2.3.8.** Color: As selected by Architect from standard color line.

2.4. ACCESSORIES

- 2.4.1.** Subfloor Filler: Portland cement based, Ardex, <http://www.ardex.com/>, or equal, type recommended by flooring material manufacturer. Use of gypsum based filler is prohibited.
- 2.4.2.** Seam Sealer: Provide carpet manufacturers recommended solvent-free seam sealer.
- 2.4.3.** Transition Strip: Johnson Rubber Company, vinyl type, #CTA-xx-A, color as selected.
- 2.4.4.** Adhesives: Provide W.F. Taylor [phone (909) 360-6677] or equal, Envirotec low VOC adhesive, Series as recommended by manufacturer. Adhesive VOC emissions shall not exceed maximum 0.60 mg/square meter/hour after 24 hours per EPA D.E.C. Testing method. Confirm adhesive compatibility with flooring manufacturer prior to installation. Solvent based adhesives not permitted.

2.5. OTHER MATERIALS

- 2.5.1.** Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

- 3.1.1.1.** Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
- 3.1.1.2.** Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
- 3.1.1.2.1.** Verify floor substrate moisture content is within manufacturers limits as determined by manufacturers calcium chloride test.
- 3.1.1.3.** In the event of discrepancy, immediately notify the Architect.
- 3.1.1.4.** Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

3.2.1. Moisture testing

- 3.2.1.1.** Conduct anhydrous calcium chloride testing using prepackaged kit systems approved by flooring manufacturer.
- 3.2.1.2.** Provide test at coverage rate required by flooring manufacturer, with minimum of 3 tests/first 1,000 square feet and 1 test per each 1,000 square feet after. Distribute uniformly throughout building. Prepare map or diagram of test locations in each building.
- 3.2.1.3.** Conduct one set of tests 60 days prior to scheduled flooring installation. Submit test results to Architect within 48 hours of test receipt.
- 3.2.1.4.** Conduct second set of tests 14 days prior to scheduled flooring installation. Submit test results to Architect within 48 hours of test receipt.
- 3.2.1.5.** Submit testing to Architect prior to beginning slab preparation or flooring work.

3.2.2. Alkalinity Testing

- 3.2.2.1.** Conduct alkalinity testing of slab surface immediately following removal of calcium chloride test kit, using distilled water and litmus paper procedure recommended by manufacturer.

- 3.2.3.** Evaluate existing floor surface. Prepare surface and apply underlayment to all floor surfaces exhibiting the following characteristics:
- 3.2.3.1.** Cracks, gouges or holes exceeding 1/16 inch in any dimension.
 - 3.2.3.2.** Cracks with adjacent surfaces exceeding 1/16 inch in height.
 - 3.2.3.3.** All expansion, weakened plane or construction joints.
 - 3.2.3.4.** All surfaces exhibiting rough or abraded texture exceeding 1/16 inch amplitude.
 - 3.2.3.5.** All surfaces with gap exceeding 3/16 inch under 10 foot metal straight edge.
- 3.2.4.** Filler Installation:
- 3.2.4.1.** Prepare existing concrete substrate as recommended by filler manufacturer, including mechanical shot-blasting or equivalent.
 - 3.2.4.2.** Acid etching is not acceptable.
 - 3.2.4.3.** Prepare existing cracks in substrate as recommended by manufacturer.
 - 3.2.4.4.** Apply filler and trowel to leave a smooth, flat, hard surface.
 - 3.2.4.5.** Prohibit traffic from area until filler is cured. Vacuum clean substrate.
- 3.2.5.** Floor Preparation:
- 3.2.5.1.** Remove all outlet floor plates and utility covers, door stops, and similar components. Label and store for re-installation.
 - 3.2.5.2.** Remove all curing compounds, waxes, grease, paint and other coatings by Architect approved means. Vacuum substrate clean.
 - 3.2.5.3.** Apply primers as recommended by carpet manufacturer.
- 3.3.** INSTALLATION - DIRECT GLUE-DOWN CARPET
- 3.3.1.** Apply carpet and adhesive in accordance with manufacturers' instructions and CRI-104 Section 8, "Direct Glue-Down Installation".
 - 3.3.2.** Verify carpet match before cutting to ensure minimal variation between dye lots. Variation in color and texture, as determined solely by the Architect, within a room or area will not be acceptable.
 - 3.3.3.** Install carpet *as recommended by carpet manufacturer* to allow intended seam and pattern match. Make cuts straight, true, and unfrayed.
 - 3.3.4.** Locate seams in area of least traffic. Fit seams straight, not crowded or peaked, free of gaps. Install carpet adjacent to wall or casework edges, closely following edge without gaps. Cut and tightly fit carpet around interruptions, such as floor outlet boxes, columns and similar penetrations.
 - 3.3.5.** Apply seam sealer as required by manufacturer to provide specified warranty.

- 3.3.6. Lay carpet on floors with run of pile in same direction as anticipated traffic. Do not change run of pile in any room where carpet is continuous through a wall opening into another room.
- 3.3.7. Locate change of color or pattern between rooms under door centerline.
- 3.3.8. Install specified edge transition where carpet terminates at other floor finishes.
- 3.3.9. Trim all loose yarn from seams by manufacturers approved methods.
- 3.3.10. Roll or sweep all carpet to remove air pockets and ensure adhesion.

3.4. CLEANING

- 3.4.1. Remove excess adhesive from floor, base, and wall surfaces without damage.
- 3.4.2. Clean and vacuum carpet surfaces.

3.5. PROTECTION

- 3.5.1. Prohibit traffic from carpet areas for 24 hours after installation.
- 3.5.2. Provide non-staining, slip resistant traffic path protection until final cleaning.

END OF SECTION

SECTION 09 84 33
SOUND ABSORBING WALL PANELS

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Fabric covered sound absorbing wall panels.

1.2. QUALITY ASSURANCE

- 1.2.1.** Flame spread and smoke development shall comply with Class A values and all applicable IBC regulations.

1.3. SUBMITTALS

- 1.3.1.** Submit manufacturers product data, shop drawings, samples, and installation instructions in accordance with Section 01 33 00.
- 1.3.2.** Indicate on shop drawings panel configurations, corner details, and attachment locations.
- 1.3.3.** Submit four samples 6 x 9 inches of each fabric covering as shown on the finish schedule.
- 1.3.4.** Submit manufacturers maintenance and cleaning instructions under the provisions of Section 01 77 19.

1.4. DELIVERY, STORAGE, AND HANDLING

- 1.4.1.** Deliver to site and store in accordance with the provisions of Section 01 60 00.
- 1.4.2.** Store off the ground in a protected area free of excessive moisture or fumes.

1.5. ENVIRONMENTAL REQUIREMENTS

- 1.5.1.** Provide continuous ventilation and heating facilities to maintain substrate surface and ambient temperatures above 60 degrees F, unless required otherwise by manufacturer's instructions.
- 1.5.2.** Do not apply adhesive when substrate surface temperature or ambient temperature is below 60 degrees F or relative humidity is above 40 percent.
- 1.5.3.** Maintain these conditions 24 hours before, during, and after installation of adhesive wall covering.
- 1.5.4.** Provide lighting level of 80 ft candles measured mid - height at substrate surfaces.

2. PART 2 - PRODUCTS

2.1. MANUFACTURERS

- 2.1.1.** Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. SOUND ABSORBING WALL PANELS

- 2.2.1.** Manufacturer: Guilford of Maine (www.guilfordofmaine.com) or equal by Lamvin, <http://www.lamvin.com/>.

- 2.2.2.** Type: Fiberglass core fabric faced panel.

- 2.2.3.** Construction:

- 2.2.3.1.** Size: 2 or 4 inches thick as indicated, sizes as shown on Drawings. No joints permitted, except at locations shown on Drawings.

- 2.2.3.2.** Edge: Bevel edge. Bevel edge dimension to align with door frame projection.

- 2.2.3.3.** Core: Fiberglass, 2 or 4 inches thick as indicated, 7 pcf density, chemically hardened face and edge.

- 2.2.3.4.** Finish: Fabric faced, Guilford, FR701, Style 2100, color as selected by the Architect.

- 2.2.3.5.** Panel Attachment: Adhesive applied.

- 2.2.4.** Styles:

- 2.2.4.1.** AWP-1: Guilford Panel 72, FR701, 2 inches thick. Color Selected by Architect from Mfgs. Full range.

- 2.2.5.** Fire/Habitability Criteria

- 2.2.5.1.** Comply with State Fire Marshal criteria.

- 2.2.5.2.** Flame Spread: Maximum value of 25 per ASTM E84.

- 2.2.5.3.** Smoke Developed: Maximum value of 450 per ASTM E84.

- 2.2.5.4.** Speech Privacy Rating: 0.80 per ASTM C423 and E795, Type A Mounting.

- 2.2.5.5.** NRC Value: 0.70 per ASTM C423 and E795, Type A Mounting.

2.3. ACCESSORIES

- 2.3.1.** Adhesive: Water based, strippable type recommended by panel manufacturer to suit substrate.

- 2.3.2.** Fiberboard Panel Adhesive: water based, type recommended by panel manufacturer to suit substrate.

- 2.3.3. Substrate Filler: As recommended by adhesive and wall covering manufacturers and compatible with substrate.

2.4. FABRICATION

- 2.4.1. Laminate facing to core utilizing manufacturers standard adhesives.
- 2.4.2. Stretch fabric covering over core assembly, bond to edge and return 1 inch minimum at back and securely fasten free edge.
- 2.4.3. Trim and turn corners neatly with raw edges concealed.
- 2.4.4. Permanently attach mounting devices to back of panels.

2.5. OTHER MATERIALS

- 2.5.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

- 3.1.1.1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
- 3.1.1.2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 - 3.1.1.2.1. Verify that substrate surfaces are prime painted and ready to receive work, and conform to requirements of the wall covering manufacturer.
 - 3.1.1.2.2. Verify flatness tolerance of surfaces does not vary more than 1/8 inch in 10 feet nor vary at a rate greater than 1/16 inch per foot.
- 3.1.1.3. In the event of discrepancy, immediately notify the Architect.
- 3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

- 3.2.1. Verify drywall surfaces are ready to receive wall panels.
- 3.2.2. Fill cracks and smooth irregularities with filler; sand smooth.
- 3.2.3. Sand glossy surfaces. Shellac marks which may bleed.
- 3.2.4. Remove electrical, telephone, and wall plates and covers.

3.2.5. Vacuum clean surfaces free of loose particles.

3.2.6. Apply one coat of primer/sealer to substrate surfaces. Allow to dry. Lightly sand smooth. Vacuum clean.

3.3. INSTALLATION

3.3.1. Install panels in accordance with the manufacturers instructions.

3.3.2. Attach top mounting clips and bottom velcro tape to wall with mechanical fasteners into solid backing.

3.3.3. Install panels plumb and level in locations indicated on the Drawings.

3.4. CLEANING

3.4.1. Vacuum panels to remove construction debris.

3.5. PROTECTION

3.5.1. Protect panels under the provisions of Section 01 60 00.

3.5.2. Cover panels with plastic or heavy paper to protect from disfigurement.

END OF SECTION

SECTION 09 91 00

PAINTING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Surface preparation.
- 1.1.2.** Surface paint and stain finishes as scheduled.

1.2. REFERENCES

- 1.2.1.** ASTM B 117 – Practice for Operating Salt Spray (Fog) Apparatus.
- 1.2.2.** ASTM D 16 - Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products.
- 1.2.3.** ASTM D 3359 – Test Method for Measuring Adhesion by Tape Test.
- 1.2.4.** ASTM D 4060 – Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
- 1.2.5.** ASTM E 84 – Test Method for Surface Burning Characteristics of Building Materials.
- 1.2.6.** ASTM G 154 - Practice for Operating Light-and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials.

1.3. REGULATORY REQUIREMENTS

- 1.3.1.** Submit manufacturer's certification of compliance with local criteria regarding VOC limits for all applied paints and coatings.

1.4. QUALITY ASSURANCE

- 1.4.1.** Applicator: Company specializing in commercial painting and finishing with 5 years documented experience.
- 1.4.2.** Installing Foreman: Individual specializing in applying specified systems with minimum 10 years documented experience.
- 1.4.3.** Pre-installation conference: Convene a pre-installation conference two weeks prior to commencing work of this Section. Provide minimum 2 weeks advance notice to Owner and Architect of scheduled date. Comply with provisions of Section 01 31 13. Attendance by paint and coating material manufacturer's representative is mandatory. At pre-installation conference, review installation procedures, inspection/testing procedures and coordination required with related work.

1.5. SUBMITTALS

- 1.5.1.** Provide submittals under provisions of Section 01 33 00.
- 1.5.2.** Product Data: Submit product data of all proposed products, identifying product series, material composition, performance characteristics and sheen.

- 1.5.2.1.** Submit manufacturer's certificate that products comply with current safety and environmental regulations, including hazardous materials labeling and air quality/VOC regulations
 - 1.5.2.2.** Submit manufacturer's certificate that products are physically and chemically compatible with each other and meet listed ASTM or Federal Specifications.
 - 1.5.2.3.** Where applicable, provide manufacturer's written evaluation of existing paint/coating systems, including directions as to surface preparation and primers compatible with existing systems.
- 1.5.3.** Submit manufacturer's application instructions for each painting system, including surface preparation.
- 1.5.4.** Color Selection procedure:
 - 1.5.4.1.** Provide Architect with samples of complete color and sheen range available for submitted products.
 - 1.5.4.2.** Based on submitted samples and specified color criteria, Architect will prepare preliminary color schedule for all field applied coatings.
 - 1.5.4.3.** Based on preliminary color schedule, submit samples of all coatings, applied on specified substrate. Submit three samples, approximately 8 x 10 inch in size, illustrating each color and sheen scheduled.
 - 1.5.4.4.** After review of preliminary color schedule samples, Architect will prepare final color schedule. Where different from preliminary schedule, submit three samples, approximately 8 x 10 inch in size, illustrating revised color and sheen.
- 1.5.5.** Masonry
 - 1.5.5.1.** Provide 4' x 4' sample of sealer applied to masonry for approval by Owner. Coordinate with Owner where the sample is to be applied. If no sample agreed upon, provide sample on (2) smooth face block and (2) split face blocks used in the project. Do not proceed until Owner has approved sample.

1.6. DELIVERY, STORAGE, AND HANDLING

- 1.6.1.** Deliver products to site under provisions of Section 01 60 00.
- 1.6.2.** Store and protect products under provisions of Section 01 60 00.
- 1.6.3.** Deliver products to site in sealed and labeled containers; inspect to verify acceptance.
- 1.6.4.** Container labeling to include manufacturer's name, type of paint, brand name, brand code, coverage, surface preparation, drying time, cleanup, color designation, and instructions for mixing and reducing.
- 1.6.5.** Store paint materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in an enclosed metal storage container located outside of building, unless required otherwise by manufacturer's instructions.
- 1.6.6.** Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.7. ENVIRONMENTAL REQUIREMENTS

- 1.7.1.** Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 65 degrees F for 24 hours before, during, and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.
- 1.7.2.** Prior to beginning preparation and coating application, provide lighting level of 80 foot candles measured on substrate surface. Where natural lighting does not provide such levels, provide temporary lighting.

1.8. SPECIAL INSPECTION PROCEDURES

1.8.1. Independent Inspection

- 1.8.1.1.** Owner may elect to have an independent service inspect coating thickness and other characteristics to determine compliance with specified criteria.
- 1.8.1.2.** Provide complete access to inspection *service*, and coordinate with all testing required by inspection service.

1.9. EXTRA STOCK:

- 1.9.1.1.** Provide an unopened five gallon container of each color and sheen to Owner.
- 1.9.1.2.** Label each container with color, sheen, and room locations, in addition to the manufacturer's label.

2. PART 2 - PRODUCTS

2.1. ACCEPTABLE MANUFACTURERS

- 2.1.1.** Basis of Design: Specific products listed on Schedule in Part 3 of this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions under the provisions of Section 01 25 00.

2.2. MATERIALS

- 2.2.1.** Coatings: Ready mixed, except field catalyzed coatings.
- 2.2.2.** Coatings: Good flow and brushing properties; capable of drying or curing free of streaks or sags.
- 2.2.3.** Accessory Materials: Provide all admixtures, thinners, flow agents and other materials not specifically indicated but required to achieve the finishes specified.

2.3. FINISHES/COLOR

- 2.3.1.** Refer to schedule at end of Section for type of surface finish.
- 2.3.2.** Colors shall be selected by Architect as specified.
- 2.3.3.** Each coat shall be a perceptibly different tint.
- 2.3.4.** Color Range:

Interior paint metal: Sherwin Williams # 2378 Ocotillo.

Interior wall paint (non masonry): Sherwin Williams #1039 Zurich White

Exterior paint metal: Sherwin Williams #1196 Established Green

Exterior Soffit: Match existing

2.4. OTHER MATERIALS

- 2.4.1.** Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

- 3.1.1.1.** Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

- 3.1.1.2.** Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

- 3.1.1.2.1.** Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

- 3.1.1.2.2.** Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the maximum levels recommended by the manufacturer:

- 3.1.1.3.** In the event of discrepancy, immediately notify the Architect.

- 3.1.1.4.** Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

- 3.2.1.** Remove electrical plates, hardware, light fixture trim, and fittings prior to preparing surfaces or finishing.

- 3.2.2.** Correct minor defects and clean surfaces which affect work of this Section.

- 3.2.3.** Shellac and seal marks which may bleed through surface finishes.

- 3.2.4.** Steel Surfaces:

- 3.2.4.1.** Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous.

- 3.2.4.2.** Bare Steel: Sand and scrape to remove loose primer and rust. Clean surfaces with solvent.

- 3.4.8.** Do not paint over labels at fire rated doors, door or window frames or other fire rated assemblies.
- 3.4.9.** Paint all structural components and surfaces visible through louvers and vents in wall and soffit surfaces.
- 3.4.10.** Steel Doors: Finish all surfaces of doors, including tops and bottoms.
 - 3.4.10.1.** Apply paint to non-factory prefinished doors and frames by spray method only.
- 3.4.11.** Wood Doors: Finish all surfaces of doors, including tops and bottoms.
 - 3.4.11.1.** Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
 - 3.4.11.2.** Apply two coats of approved sealer to all surfaces milled for hardware preparation, including hinge mortise, latching mechanism cutout and related door penetrations.
 - 3.4.11.3.** Apply paint to non-factory prefinished doors and frames by spray method only.
 - 3.4.11.4.** Before finishing, remove handling marks and exposure markings from all surfaces and edges with a complete block sanding using at least 150 grit sandpaper. Ease all edges. Steam out all scratches before sanding. Comply with WI Manual Section 1, including use of sanding sealers and fillers.
- 3.4.12.** Exterior surfaces, including plaster, concrete, metal fabrications, structural components and metal flashings: Unless noted otherwise, apply paints and coatings as specified below:
 - 3.4.12.1.** Unless noted otherwise, do not paint exterior galvanized metals, including railings, steel structural components, all roof flashings and accessories, all plaster trim and accessories, and all mechanical and electrical system components.
 - 3.4.12.2.** Do not paint exterior galvanized metal handrails and railings.
 - 3.4.12.3.** Apply exterior paint to all roof penetrations visible to the eye from typically occupied locations in the finished project. Color to be selected by architect. "Typically occupied" includes those portions of the project visible to a standing person from elevated portions of the site.

Unless designated prefinished on drawings, apply exterior paint to metal roof copings, gutters, downspouts and flashings visible to the eye from typically occupied locations in the finished project. Color to be selected by architect.
 - 3.4.12.4.** Masonry: Clean and apply as directed by sealer manufacturer. Provide a RILEM tube test resulting in no water loss after 3 minutes. Provide Owner with min. 5 year water repellency warranty.
 - 3.4.12.5.** Apply paint to all other exterior components as specified or shown on drawings.

3.5. FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

- 3.5.1.** Paint shop primed equipment. Paint shop prefinished items exposed to view in non - utility areas.
- 3.5.2.** Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- 3.5.3.** At interior and exterior applications, prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, mechanical equipment units, hangers, brackets, collars and supports, except where items are prefinished.
- 3.5.4.** Replace identification markings on mechanical or electrical equipment when painted accidentally.
- 3.5.5.** Paint interior surfaces of air ducts, and convector and baseboard heating cabinets that are visible through grilles and louvers with flat black paint, to limit of sight line. Paint dampers, except fire dampers, exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
- 3.5.6.** Paint exposed panels, pedestals, boxes, conduit and related electrical equipment occurring in exterior and interior finished areas.
- 3.5.7.** Replace electrical plates, hardware, light fixture trim, and fittings removed prior to finishing.

3.6. CLEANING

- 3.6.1.** As Work proceeds, promptly remove paint where spilled, splashed, or spattered.
- 3.6.2.** During progress of Work maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris.
- 3.6.3.** At end of workday remove from building flammable paint, solvents, and reducing agents.
- 3.6.4.** Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

3.7. SCHEDULE

- 3.7.1.** For ease of specifying, unless otherwise noted, product numbers of Sherwin Williams have been used. Equivalent products of Frazee, Glidden Professional, Dunn Edwards, and other manufacturers may be used subject to the substitution provisions listed under Section 01 25 00.
- 3.7.2. INTERIOR SURFACES**
 - 3.7.2.1. Miscellaneous metal- Galvanized - **Semi-Gloss** (PF-1)**
 - 3.7.2.1.1.** Solvent clean, etch with PCI 02150 Metal Conditioner solution and rinse with clear water.
 - 3.7.2.1.2.** One coat primer S-W Procryl Universal Primer, B66-310
 - 3.7.2.1.3.** Two Coats Finish S-W Solo-Semi-Gloss, B31W,8651
 - 3.7.2.2. Gypsum Board - **Low Sheen/Eggshell** Paint Finish (PF-2)**

- 3.7.2.2.1. One coat S-W Progreen 200 Primer B28W600
 - 3.7.2.2.2. Two coats S-W Promar 200 Zero, B20-2600 Eggshell
- 3.7.2.3. Gypsum Board - **Semi-Gloss Enamel** finish (PF-3)
 - 3.7.2.3.1. One coat S-W Progreen 200 print B28W600
 - 3.7.2.3.2. Two coats S-W Promar 200 Zero, B31-2600 Semi-Gloss
- 3.7.2.4. Gypsum Board – **Flat** finish (PF-4)
 - 3.7.2.4.1. One coat S-W Pro Green 200 Primer B28W600
 - 3.7.2.4.2. Two coats S-W Promar 200 Zero, B30W260C Flat
- 3.7.2.5. Ferrous metal piping, miscellaneous metal fabrications, and related components. (PF-5)
 - 3.7.2.5.1. Solvent clean and rinse with clear water.
 - 3.7.2.5.2. One coat primer S-W Procryl Universal primer B66-310
 - 3.7.2.5.3. Two Coats Finish Solo Semi-Gloss B31W 8651
- 3.7.2.6. Wood - Transparent finish – (ST-1)
 - 3.7.2.6.1. Two coats S-W wood classics waterborne polyurethane varnish A68 Series.
- 3.7.2.7. Steel Doors/Door and Window Frames - primed - **Semi-Gloss** (PFX-1)
 - 3.7.2.7.1. One coat primer S-W Procryl universal primer B66-310
 - 3.7.2.7.2. Two Coats S-W Solo Semi-gloss B31W 8651
- 3.7.2.8. Galvanized flashings, ductwork, electrical conduit, and related components: Eggshell enamel finish
 - 3.7.2.8.1. Solvent clean, etch with PCI 02150 Metal Conditioner solution and rinse with clear water.
 - 3.7.2.8.2. One coat procryl universal primer B66-310
 - 3.7.2.8.3. Two Coats promar 200 zero B20-2600
- 3.7.3. EXTERIOR SURFACES
 - 3.7.3.1. Exposed Ferrous metal piping, steel canopy members, miscellaneous metal fabrications, and related components, – galvanized and non-galvanized- (PFX-2).
 - 3.7.3.1.1. One coat Tnemec primer as recommended by coating manufacturer.
 - 3.7.3.1.2. Base coat: V69F Epoxiline

3.7.3.1.3. Two coats Tnemec Series 1029 Enduratone Acrylic Polymer at 2-3 mils DFT.

END OF SECTION

SECTION 10 14 00

SIGNAGE

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Permanent room or space identification signage

1.2. REGULATORY REQUIREMENTS

- 1.2.1.** Comply with signage requirements of the Americans with Disabilities Act Accessibility Guidelines (ADAAG), as currently amended.

1.3. SUBMITTALS

- 1.3.1.** Submit under provisions of Section 01 33 00.

- 1.3.2.** Shop Drawings:

- 1.3.2.1.** Indicate sign size, message, and mounting. Coordinate sign text with Owner.

- 1.3.2.2.** Identify mounting location and alignment with adjacent construction and features.

- 1.3.3.** Product Data: Provide data on material construction, hardware, and accessories.

- 1.3.4.** Samples:

- 1.3.4.1.** Color range: Submit two brochures or other approved submittal of full color range available for each signage application.

- 1.3.4.2.** Submit two samples of representative signage illustrating dimensional characteristics, finish and sheen for Architect selection.

- 1.3.4.2.1.** Submit samples of representative tactile/braille signage illustrating letter stroke proportions and braille dot size, spacing and characteristics.

- 1.3.5.** Certification:

- 1.3.5.1.** Certification: Accompanying submittal, provide sign fabricator/manufacturers written certification stating signs as designed and installed will comply with applicable criteria of ADAAG, including letter style, spacing and size.

- 1.3.5.2.** Prior to installation, provide sign fabricator/manufacturers written certification stating tactile and braille signs comply with specified criteria, including proof-reading requirements.

1.4. DELIVERY, STORAGE, AND HANDLING

- 1.4.1.** Deliver products to site. Store and protect under provisions of Section 01 60 00.

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

- 2.1.1.** Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. PERMANENT ROOM IDENTIFICATION SIGNAGE

- 2.2.1.** Manufacturer: FastSigns fastsigns.com (specified as basis of design) or equal.
- 2.2.2.** Type: Two color sign with raised lettering and border, match Owner's sample
- 2.2.3.** Material Characteristics: 0.153 inch thick zinc alloy.
- 2.2.4.** Type: Photopolymer sign 1/8" thick exterior, raised text and Braille signs.
- 2.2.5.** Sign Size, Design, Style Criteria:
- 2.2.5.1.** Character size: 5/8 inch minimum, maximum 2 inch height, raised 1/32 inch above surface.
 - 2.2.5.2.** Character proportion: Provide width to height ratio between 3:5 and 1:1.
 - 2.2.5.3.** Character stroke proportion: Provide stroke width to height ratio between 1:5 and 1:10.
 - 2.2.5.4.** Letter Style: Upper case Arial Bold.
 - 2.2.5.5.** Braille criteria: Provide contracted Grade 2 braille, with dots spaced 1/10 inch on center in each cell, and cells spaced 2/10 inch apart, measured from the second row of dots in the first cell to the first row of dots in the second cell. Provide dots raised 1/40 inch above surface, with slightly rounded or eased profile.
 - 2.2.5.6.** Design sign with room number on first line, room name on second, braille message on third line. Center all copy. Provide minimum 1/2 inch clear space all around braille image.
- 2.2.6.** Sign Message:
- 2.2.6.1.** **RS-1** - Room Signs: Provide signs at locations shown on drawings. At all exterior entrance doors, provide symbol of accessibility per details.
 - 2.2.6.2.** **RS-2** - Exit Signs: Provide signs at all door locations with exit signs required by IBC Chapter 10
- 2.2.7.** Finish/Contrast/Color:
- 2.2.7.1.** Finish: Provide signs with matte, non-reflective finish, with a maximum 11-19 degree gloss on 60 degree dosimeter.
 - 2.2.7.2.** Contrast: Provide signs with minimum light to dark contrast between background and message of 70 percent.

- 2.2.7.3.** Color: Provide signs with two colors as selected by Architect from manufacturers standard color line.
 - 2.2.7.3.1.** Background: Color 1, selected from very dark color range.
 - 2.2.7.3.2.** Message: Color 2 selected from white or very light color range.
 - 2.2.7.3.3.** International Symbol of Accessibility: White symbol on Federal Blue background.
- 2.2.7.4.** Exterior: Provide stainless steel spanner head tamper resistant screw in expansion shields suitable for substrate. Countersink screw flush with surface.
- 2.2.7.5.** Interior: Unless noted otherwise, provide double stick foam tape mounting, 1/32 inch thick.
- 2.2.7.6.** Where signs are mounted on glass panels, install using structural silicone sealant method specified in this Section.
- 2.2.7.7.** Verify surfaces with irregular or rough finish have been properly finished to establish flush and lip free installation.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

- 3.1.1.1.** Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
- 3.1.1.2.** Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
- 3.1.1.3.** In the event of discrepancy, immediately notify the Architect.
- 3.1.1.4.** Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

3.2.1. General criteria:

- 3.2.1.1.** Install in accordance with manufacturer's instructions and approved submittals.
- 3.2.1.2.** Coordinate location of all signage with Architect.
- 3.2.1.3.** Install on clean and properly prepared surfaces.

3.2.2. Permanent room, directional and informational signage:

- 3.2.2.1.** Install signs after substrate surfaces receive final finish.
- 3.2.2.2.** Center room identification signage at 60 inches above floor, located on strike side of door or as directed by Architect.
- 3.2.2.3.** Where signs are installed in sealant method on glass panels, provide back plate matching sign at opposite side of glass
- 3.2.2.4.** When sign is installed on window surface or other similar recessed conditions, provide spacer as required to maintain sign face within 3 inches of outermost wall plane.
- 3.2.3.** Exterior letters and signs:
 - 3.2.3.1.** Mount at locations as shown on drawings, level and plumb.
 - 3.2.3.2.** Mount wall mounted signage fasteners in sealant bedding.
 - 3.2.3.3.** Coordinate location with Architect.
- 3.2.4.** Clean and polish all signage after installation.

END OF SECTION

SECTION 10 22 13

WIRE MESH PARTITIONS

1. GENERAL

1.1. RELATED DOCUMENTS

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

1.2. SUMMARY

1.2.1. Section Includes:

- 1.2.1.1.** Standard-duty wire mesh partitions.

1.2.2. Related Sections:

- 1.2.2.1.** Division 03 Section "Cast-in-Place Concrete" for building anchors into concrete construction for wire mesh partitions.
- 1.2.2.2.** Division 04 Section "Unit Masonry" for building anchors into masonry construction for wire mesh partitions.

1.3. DEFINITIONS

1.3.1. As defined in ASTM E 2016:

- 1.3.1.1.** Intermediate Crimp: Wires pass over one and under the next adjacent wire in both directions, with wires crimped before weaving and with extra crimps between the intersections.
- 1.3.1.2.** Lock Crimp: Deep crimps at points of the intersection that lock wires securely in place.

1.4. PERFORMANCE REQUIREMENTS

- 1.4.1.** Design wire mesh units, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1.4.1.1.

- 1.4.1.2.** Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1.5. SUBMITTALS

- 1.5.1.** Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for wire mesh items.

- 1.5.2.** Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1.5.2.1.** Include clearances required for operation of gates.
 - 1.5.3.** Setting Drawings: For anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry.
 - 1.5.4.** Samples for Initial Selection: For units with factory-applied color finishes.
 - 1.5.5.** Samples for Verification: 12-by-12-inch panel constructed of specified frame members and wire mesh. Show method of finishing members at intersections.
 - 1.5.6.** For wire mesh units indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1.5.7.** Qualification Data: For qualified Installer.
 - 1.5.8.** Retain first paragraph below if retaining procedures for welder certification in "Quality Assurance" Article.
 - 1.5.9.** Welding certificates.
 - 1.5.10.** Maintenance Data: For wire mesh unit hardware to include in maintenance manuals.
- 1.6. QUALITY ASSURANCE**
- 1.6.1.** Installer Qualifications:
 - 1.6.1.1.** Installer's responsibilities include fabricating and installing wire mesh items and providing professional engineering services needed to assume engineering responsibility.
 - 1.6.1.2.** Engineering Responsibility: Preparation of data for wire mesh items, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
 - 1.6.2.** Source Limitations: Obtain wire mesh items from single source from single manufacturer.
 - 1.6.3.** Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1.6.3.1.** AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 1.6.3.2.** AWS D1.3, "Structural Welding Code - Sheet Steel."
 - 1.6.4.**

1.7. DELIVERY, STORAGE, AND HANDLING

- 1.7.1.** Deliver wire mesh items with cardboard protectors on perimeters of panels and doors and with posts wrapped to provide protection during transit and Project-site storage. Use vented plastic.

1.8. PROJECT CONDITIONS

- 1.8.1.1.** Field Measurements: Verify actual dimensions of construction contiguous with wire mesh units by field measurements before fabrication.

2. PRODUCTS

2.1. MANUFACTURERS

- 2.1.1.1.** Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- 2.1.1.2.** California Wire Products Corporation.

2.2. MATERIALS

- 2.2.1.** Steel Wire: ASTM A 510.
- 2.2.2.** Steel Plates, Channels, Angles, and Bars: ASTM A 36/A 36M.
- 2.2.3.** Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- 2.2.4.** Steel Pipe: ASTM A 53/A 53M, Schedule 40 unless another weight is indicated or required by structural loads.
- 2.2.5.** Square Steel Tubing: ASTM A 500, cold-formed structural-steel tubing.
- 2.2.6.** Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with G60 zinc (galvanized) or A60 zinc-iron-alloy (galvannealed) coating designation.
- 2.2.7.** Panel-to-Panel Fasteners: Manufacturer's standard steel bolts, nuts, and washers.
- 2.2.8.** Postinstalled Expansion Anchors: With capability to sustain, without failure, load imposed within factors of safety indicated, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 - 2.2.8.1.** For Postinstalled Anchors in Concrete: Capability to sustain, without failure, a load equal to four times the loads imposed.
 - 2.2.8.2.** For Postinstalled Anchors in Grouted Masonry Units: Capability to sustain, without failure, a load equal to six times the loads imposed.

2.2.9. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated and fabricated from corrosion-resistant materials; with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by wire mesh construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

2.2.10.

2.2.11.

2.3. STANDARD-DUTY WIRE MESH PARTITIONS

2.3.1. Mesh: 0.135-inch- diameter, intermediate-crimp steel wire woven into 1-1/2-inch diamond mesh.

2.3.2. Vertical Panel Framing: 1-1/4-by-5/8-by-0.097-inch cold-rolled, C-shaped steel channels with 1/4-inch diameter bolt holes spaced not more than 18 inches o.c. along center of framing.

2.3.3. Horizontal Panel Stiffeners: 2 cold-rolled steel channels, not less than 1 by 3/8 by 1/8 inch, bolted or riveted toe to toe through mesh or 1-by-1/2-by-1/8-inch cold-rolled steel channels with wire woven through.

2.3.4. Top Capping Bars: 2-1/4-by-1-inch cold-rolled steel channels.

2.3.5. Posts for 90-Degree Corners: 1-1/4-by-1-1/4-by-1/8-inch steel angles with 1/4-inch-diameter bolt holes aligning with bolt holes in vertical framing; with floor anchor clips.

2.3.6. Posts for Other-Than-90-Degree Corners: Manufacturer's standard steel pipe or tubing with 1/4-inch- diameter bolt holes aligning with bolt holes in vertical framing.

2.3.6.1. Partitions up to 12 Feet High: 1-1/4-inch OD.

2.3.7. Adjustable Corner Posts: 2, manufacturer's standard steel pipe or tubing posts connected by steel hinges at 36 inches o.c. attached to posts; with 1/4-inch diameter bolt holes aligning with bolt holes in vertical framing.

2.3.8. Line Posts: 3-inch-by-4.1-lb or 3-1/2-by-1-1/4-by-0.127-inch steel channels; with 5-by-18-by-1/4-inch steel base plates punched for attachment to floor.

2.3.9. Floor Shoes: Steel, cast iron, or cast aluminum, not less than 2 inches (50 mm) high; sized to suit vertical framing, drilled for attachment to floor, and with set screws for leveling adjustment.

2.3.10. Swinging Gates: Fabricated from same mesh as partitions, with framing fabricated from 1-1/4-by-1/2-by-1/8-inch steel channels or C-channels, banded with 1-1/4-by-1/8-inch flat steel bar cover plates on 4 sides, and with 1/8-inch- thick angle strike bar and cover on strike jamb.

2.3.10.1. Hinges: Full-surface type, 3-by-3-inch steel, 1-1/2 pairs per door; bolted, riveted, or welded to door and jamb framing.

2.3.10.2. Padlock Lug: Mortised into door framing and enclosed with steel cover.

2.3.11. Accessories:

2.3.11.1. Adjustable Filler Panels: Not less than 0.060-inch thick, cold-rolled steel sheet; capable of filling openings from 2 to 12 inches.

2.3.11.2. Wall Clips: Manufacturer's standard, cold-rolled steel sheet allowing up to 1 inch of adjustment.

2.3.12. Finish for Uncoated Ferrous Steel: Baked-enamel finish.

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

2.4. FABRICATION

2.4.1. General: Fabricate wire mesh items from components of sizes not less than those indicated. Use larger-sized components as recommended by wire mesh item manufacturer. As required for complete installation, provide bolts, hardware, and accessories with manufacturer's standard finishes.

2.4.1.1. Fabricate wire mesh items to be readily disassembled.

2.4.1.2. Welding: Weld corner joints of framing and finish sand.

2.4.2. Standard-duty Wire Mesh Partitions: Fabricate wire mesh partitions with cutouts for pipes, ducts, beams, and other items indicated. Finish edges of cutouts to provide a neat, protective edge.

2.4.2.1. Mesh: Securely clinch mesh to framing.

2.4.2.2. Framing: Fabricate framing with mortise and tenon corner construction.

2.4.2.2.1. Provide horizontal stiffeners as indicated or, if not indicated, as required by panel height and as recommended by wire mesh partition manufacturer. Weld horizontal stiffeners to vertical framing.

2.4.2.2.2. Fabricate partition and door framing with slotted holes for connecting adjacent panels.

2.4.2.3. Fabricate wire mesh partitions with 3 inches of clear space between finished floor and bottom horizontal framing.

2.4.2.4. Fabricate wire mesh partitions with bottom horizontal framing flush with finished floor.

2.4.2.5. Doors: Align bottom of door with bottom of adjacent panels.

2.4.2.5.1. For doors that do not extend full height of partition, provide transom over door, fabricated from same mesh and framing as partition panels.

2.4.2.6. Hardware Preparation: Mortise, reinforce, drill, and tap doors and framing as required to install hardware.

2.5. GENERAL FINISH REQUIREMENTS

- 2.5.1.** Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- 2.5.2.** Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

2.5.2.1. STEEL AND IRON FINISHES

- 2.5.3.** Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard 2-coat, baked-on finish, suitable for use indicated, consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil for topcoat.
 - 2.5.3.1.** Color and Gloss: As selected by Architect from manufacturer's full range.

3. EXECUTION

3.1. EXAMINATION

- 3.1.1.** Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- 3.1.2.** Examine floors for suitable conditions where wire mesh items will be installed.
- 3.1.3.** Examine walls to which wire mesh items will be attached for properly located blocking, grounds, and other solid backing for attachment of support fasteners.
- 3.1.4.** Proceed with installation only after unsatisfactory conditions have been corrected.

3.2. WIRE MESH PARTITIONS ERECTION

- 3.2.1.** Anchor wire mesh partitions to floor with 3/8-inch diameter, postinstalled expansion anchors at 12 inches o.c. through anchor clips located at each post and corner. Shim anchor clips as required to achieve level and plumb installation.
 - 3.2.1.1.** Anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if indicated on Shop Drawings.
- 3.2.2.** Anchor wire mesh partitions to floor with 3/8-inch- diameter, postinstalled expansion anchors at 12 inches o.c. through floor shoes located at each post and corner. Adjust wire mesh partition posts in floor shoes to achieve level and plumb installation.
 - 3.2.2.1.** Anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if indicated on Shop Drawings.
- 3.2.3.** Anchor wire mesh partitions to walls at 12 inches o.c. through back corner panel framing and as follows:
 - 3.2.3.1.** For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
 - 3.2.3.2.** For hollow masonry anchorage, use toggle bolts.

- 3.2.4.** Secure top capping bars to top framing channels with 1/4-inch diameter "U" bolts spaced not more than 28 inches o.c.
- 3.2.5.** Provide line posts at locations indicated or, if not indicated, as follows:
 - 3.2.5.1.** On each side of sliding gate openings.
 - 3.2.5.2.** For partitions that are more than 12 feet high, located between each panel.
- 3.2.6.**
- 3.2.7.** Where standard-width wire mesh partition panels do not fill entire length of run, provide adjustable filler panels to fill openings.
- 3.2.8.** Install doors complete with door hardware.
- 3.2.9.** Bolt accessories to wire mesh partition framing.
- 3.2.10.**
- 3.3. ADJUSTING AND CLEANING**
 - 3.3.1.** Adjust gates to operate smoothly and easily, without binding or warping. Adjust hardware to function smoothly. Confirm that latches and locks engage accurately and securely without forcing or binding.
 - 3.3.2.** Remove and replace defective work including doors and framing that are warped, bowed, or otherwise unacceptable.
 - 3.3.3.** Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

END OF SECTION

SECTION 10 26 00
WALL AND DOOR PROTECTION

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Wall protection elements: Corner guards.

1.2. REFERENCES

- 1.2.1.** ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials

1.3. QUALITY ASSURANCE

- 1.3.1.** Applicator: Company specializing in installing wall surfacing and protection components with 3 years documented experience.
- 1.3.2.** Installing Foreman: Individual with 3 years documented experience installing wall surfacing and protection components with 3 years documented experience.

1.4. SUBMITTALS

- 1.4.1.** Provide submittals under provisions of Section 01 33 00.

1.4.2. Product Data

- 1.4.2.1.** Submit manufacturers product data and installation instructions in accordance with Section 01 33 00.

1.4.3. Samples

- 1.4.3.1.** Submit four samples of each wall covering, 8x10 inch in size, illustrating each color, finish, and texture.

- 1.4.3.2.** Submit one sample of each corner and wall guard, 5 inches in length and including end cap/wall return, illustrating each color, finish, and texture.

1.5. DELIVER, STORAGE AND HANDLING

- 1.5.1.** Deliver products to site and store under the provision of Section 01 60 00.

1.6. ENVIRONMENTAL REQUIREMENTS

- 1.6.1.** Provide continuous ventilation and heating facilities to maintain substrate surface and ambient temperatures above 60 degrees F, unless required otherwise by manufacturer's instructions.

- 1.6.2.** Do not apply adhesive when substrate surface temperature or ambient temperature is below 60 degrees F or relative humidity is above 40 percent.

- 1.6.3.** Maintain these conditions 24 hours before, during, and after installation of adhesive wall covering.

1.6.4. Provide lighting level of 80 ft candles measured mid - height at substrate surfaces.

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. METAL CORNER GUARDS

2.2.1. Manufacturer:

2.2.1.1. Approved Manufacturers: Inpro www.inprocorp.com or equal.

2.2.2. Type: Stainless steel flush mounted 90 degree corner guard.

2.2.3. Series: SSEW-FM with 1/8 inch radius.

2.2.4. Characteristics:

2.2.4.1. Size: 3 x 3 x full wall height.

2.2.4.2. Material: Type 304 stainless steel, 16 gauge.

2.2.5. Finish/Color: # 4 satin finish.

2.3. OTHER MATERIALS

2.3.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

3.2.1. Install assembly in accordance with manufacturers instructions.

3.2.2. Use mechanical fasteners to attach to substrate.

3.3. CLEANING

3.3.1. Clean surfaces of completed installation.

END OF SECTION

SECTION 10 44 16
FIRE PROTECTION SPECIALTIES

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Fire extinguisher cabinets.Fire extinguishers.

1.1.2. Wall brackets.

1.2. SUBMITTALS

1.2.1. Submit product data and installation instructions under provisions of Section 01 33 00.

1.2.2. Include physical dimensions, operational features, color and finish, wall mounting brackets with mounted measurements, and anchorage details.

1.2.3. Verify extinguisher size and type with Architect.

2. PART 2 - PRODUCTS

2.1. CABINETS

2.1.1. Basis of Design: Characteristics of specific products manufactured by J.L Industries are indicated to establish required level of quality, appearance, and performance. The The Architect will consider comparable products by alternate manufacturers listed in this Section, and requests for substitutions, under the provisions of Section 01 25 00610.

Acceptable Alternate Manufacturers: Larsen's Potter-Roemer, or equal.

2.1.1.1. Semi - Recessed painted steel cabinet, rolled edge return trim and wire glass door, located at framed walls.

2.1.2. Type 1 Cabinet

2.1.2.1. Series/Model Number: Clear Vu 2535-F25.

2.1.2.2. Door Style: Clear Bubble.

2.1.2.3. Lock: Provide Mfgs. Safety lock

2.1.2.4. Glazing: Clear Acrylic, with FE letters, red.

2.1.2.4. Finish/Color: Stainless Steel.

2.1.3. Type 2 Cabinet

2.1.3.1. Model Number: Ambassador # -.2017

2.1.3.2. Door Style: Full glass.

2.1.3.3. Glazing: Clear wire glass, with FE letters, red.

Finish/Color: White Color Epoxy Coated tub and frame.

2.2. EXTINGUISHER

2.2.1. Manufacturers: J.L. Industries, www.jlindustries.com, or equal by Larsen's Manufacturing Company.

2.2.2. Type: Multi-Purpose Dry Chemical - UL Rating 2A-10B:C.

Type 1: Dry Chemical - UL Rating 40B:C, for use in Kitchen areas in Type 1 Cabinet.
Provide sodium bicarbonate type only.

Type 2: Multi-Purpose Dry Chemical - UL Rating 2A-10B:C, for use in other areas in Type 2 and 3 cabinet.

2.2.3. Approvals:

2.2.3.1. Approved for intended use by Arizona State Fire Marshal.

2.2.4. Color: Red Enamel (for dry chemical extinguishers).).bracket

2.2.5. Provide fire extinguisher manufacturer's recommended Where cabinet is not identified on drawings, provide approved bracket mounting mounting bracket for extinguisher.

2.3. OTHER MATERIALS

2.3.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

3.2.1. Install fire extinguishers plumb and level, with extinguisher handle located at maximum 48 inches above finish floor.

3.2.2. Secure rigidly in place.

- 3.2.3.** Inspect, tag, and charge extinguishers not more than ten days nor less than one day before actual date of Notice of Substantial Completion.

END OF SECTION

SECTION 10 56 13
METAL STORAGE SHELVING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Prefabricated, metal shelving system.

1.2. QUALITY ASSURANCE

1.2.1. Manufacturer shall have produced similar shelving systems within the past 3 years.

1.3. REGULATORY REQUIREMENTS

1.3.1. Provide design and detailing for seismic attachment/bracing of all free - standing shelving units.

1.4. SUBMITTALS

1.4.1. Submit shop drawings and product data under provisions of Section 01 33 00.

Include materials, component profiles, fastening methods, assembly methods, joint details, accessory listings, and schedule of finishes.

1.4.2. Provide verification that assembly is NSF certified.

1.4.3. Submit samples under provisions of Section 01 33 00.

1.5. WARRANTY

1.5.1. Provide 12 year warranty against rust and corrosion.

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. METAL STORAGE SHELVING SYSTEM

2.2.1. Manufacturer: Metro Shelving www.metro.com or equal

2.2.2. Series: Super Erecta Pro Shelf.

2.2.3. Characteristics

2.1.3.1 Size: 18 inch deep x width as indicated on drawings x 7 feet high.

Provide starter and additional units as required to complete plan layout.

2.2.3.1. Do not provide end panels.

2.2.3.2. Shelves: Epoxy coated metal, open grid, freestanding with shelf capacity of 800 pounds per shelf.

2.2.3.2.1. Provide shelves at 12 inches on center, with bottom shelf 6 inches above finish floor.

2.2.3.2.2. Provide open grid removable shelf mats fitted to shelf

2.2.3.3. Fasteners: . Mfg's standard

2.2.3.4. Color: As selected by Architect from Mfg's. full line

2.3. ACCESSORIES

2.3.1. Provide clips, expansion anchors, and all other required components for seismic anchorage.

2.4. OTHER MATERIALS

2.4.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

3.2.1. Set and secure shelving in accordance with approved shop drawing.

END OF SECTION

SECTION 10 81 03
BIRD CONTROL SYSTEMS

1. GENERAL

1.1. SECTION INCLUDES

1.1.1. Bird Netting

1.2. SUBMITTALS

1.2.1. Submit under provisions of Section 01 33 00.

1.2.2. Product Data: Manufacturer's data sheets on each product to be used, including:

1.2.2.1. Preparation instructions and recommendations.

1.2.2.2. Storage and handling requirements and recommendations.

1.2.2.3. Installation methods.

1.2.3. Shop Drawings: Submit manufacturer approved shop drawings for each type of product specified.

1.2.4. Samples: For each finish product specified, two samples, representing actual product, color, and patterns.

1.3. QUALITY ASSURANCE

1.3.1. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten (10) years experience.

1.3.1.1. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five (5) years demonstrated experience in installing products of the same type and scope as specified. Installation shall be performed by an installer certified by manufacturer.

1.4. DELIVERY, STORAGE, AND HANDLING

1.4.1. Store products in manufacturer's unopened packaging until ready for installation.

1.5. PROJECT CONDITIONS

1.5.1. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.6. WARRANTY

1.6.1. At project closeout, provide to Owner or Owners Representative an executed copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.

1.6.1.1. Installation Warranty: Two (2) years.

1.6.1.2. Ultraviolet Breakdown Warranty: Ten (10) years.

2. PRODUCTS

2.1. MANUFACTURERS

2.1.1. Manufacturer: Bird-B-Gone, Inc., Web: www.birdbgone.com

2.1.2. Requests for substitutions will be considered in accordance with provisions of Section 01 25 00.

2.2. HEAVY DUTY BIRD NET 2000

2.2.1. Physical Characteristics:

2.2.1.1. 1-1/8" Heavy Duty 12/6 Bird Net

2.2.2. Fabrication:

2.2.2.1. Material: U.V. Stabilized knotted polyethylene net. Flame resistant (270 deg F. melting point) Rot-Proof, non-conductive and stable in sub-zero temperatures.

2.2.2.2. Construction: Monofilaments are twisted together to produce a strong twine with 160-200 twists per meter.

2.2.2.3. Breaking Strength: ISO 1806 Protocol Mesh Test in excess of 40 lbs.

2.2.2.4. Color: Black.

2.2.3. Mounting System:

2.2.3.1. Solid Steel: For corner attachments use mfg's. corner bolts with lock nuts or multipurpose cable brackets with powder actuated fire in pins for intermediate attachments.

2.2.3.2. Steel Beams: For corner attachments use bolts with lock nuts. For intermediate attachments, use the appropriate size mfg's. girder clips.

2.2.3.3. Sheet Metal: Use mfg's. multipurpose cable brackets with self-tapping screws for both corner and intermediate attachments.

2.2.3.4. Masonry and Concrete: For corner attachments, use mfg's expanding corner net bolts. For intermediate attachments, use one of the following: open or closed net loop, net spike, split pin and anchor rivet or multipurpose cable bracket.

3. EXECUTION

3.1. EXAMINATION

3.1.1. Do not begin installation until substrates have been properly prepared.

- 3.1.2. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2. PREPARATION

- 3.2.1. Surface should be thoroughly cleaned and free of bird droppings, nesting materials, rust, peeling paint or other debris.
- 3.2.2. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- 3.2.3. Remove or repair articles that may damage work after installation, including overhanging foliage, brush and loose parts on the structure.

3.3. INSTALLATION

- 3.3.1. Install in accordance with manufacturer's instructions.
- 3.3.2. Equipment must be installed correctly, covering the entire area to be protected perfectly so pest birds cannot enter the protected area, and so the netting blends perfectly with the architecture.
 - 3.3.2.1. Install bird net tightly and securely.

3.4. PROTECTION

- 3.4.1. Protect installed products until completion of project.
- 3.4.2. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 11 13 00
LOADING DOCK EQUIPMENT

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Loading dock bumpers.

1.2. SUBMITTALS

- 1.2.1.** Materials List/Shop Drawings: Provide materials list and shop drawings per Section 01 33 00 for Architect's review.
- 1.2.2.** Maintenance Data: Submit copies of manufacturer's operation service and maintenance data, including name, address and telephone number of nearest authorized service representative.

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

- 2.1.1.** Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. The Architect will requests for substitutions, under the provisions of Section 01 25 00.

2.2. BUMPERS

- 2.2.1.** Manufacturer: Durable Corporation www.durablecorp.com or equal.
- 2.2.2.** Product Characteristics
- 2.2.2.1.** Model: B4510-99-A, for face of dock installation.
- 2.2.2.2.** Dimensions: 4-1/2" thick x 10" high x 2'-0" long.
- 2.2.3.** Construction: Laminated rubber.

2.3. OTHER MATERIALS

- 2.3.1.** Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

- 3.1.1.** Inspection
- 3.1.1.1.** Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

- 3.1.1.2.** Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
- 3.1.1.3.** In the event of discrepancy, immediately notify the Architect.
- 3.1.1.4.** Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

- 3.2.1.** Coordinate placement of anchor bolt embedments as required.
- 3.2.2.** Install all dock equipment in accordance with manufacturer's detailed instructions.
- 3.2.3.** After installation, restore marred or abraded surfaces to original condition.

END OF SECTION

SECTION 11 40 00
FOOD SERVICE EQUIPMENT

1. PART 1- GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Food service equipment, custom fabricated.
- 1.1.2.** Installation, including connection to utilities.

1.2. REFERENCES

- 1.2.1.** National Sanitation Foundation (NSF).
- 1.2.2.** Underwriters Laboratories (UL).
- 1.2.3.** National Electric Code (NEC), current edition.
- 1.2.4.** ASTM E 84, current edition.

1.3. QUALITY ASSURANCE

- 1.3.1.** Freezer/Cooler manufacturer shall have produced units similar to that specified for a period of at least five (5) years prior to contract award.

1.4. REGULATORY REQUIREMENTS

- 1.4.1.** Electrical Wiring and Components: Conform to Underwriters' Laboratories Standards.
- 1.4.2.** Comply with applicable criteria of ASTM E 84 for cooler/freezer wall panels.
- 1.4.3.** All components shall be NSF Approved and labeled.
- 1.4.4.** Electrical Wiring and Components: Conform to Underwriters' Laboratories Standards.

1.5. SUBMITTALS

- 1.5.1.** Submit shop drawings and product data under provisions of Section 01 33 00.
- 1.5.2.** Provide shop drawings of fabricated equipment showing hardware and fittings, with plan, front elevation, cross-section showing anchorage details. Show service connections, characteristics, and wiring diagrams for control systems.
- 1.5.3.** Provide shop drawings of cooler/freezer system showing panel locations, door hardware and fittings, refrigeration equipment, and all accessories. Show slab and wall anchorage details. Show service connections, characteristics, and wiring diagrams for control systems.
- 1.5.4.** Submit manufacturer's installation instructions under provisions of Section 01 33 00.
- 1.5.5.** Submit wall panel finish samples under provisions of Section 01 33 00.

1.6. OPERATION AND MAINTENANCE DATA

- 1.6.1.** Submit operation and maintenance data under provisions of Section 01 77 19 and as specified in this section.

1.7. DELIVERY, STORAGE, AND HANDLING

- 1.7.1.** Deliver products to site under provisions of the General Conditions.
- 1.7.2.** Store products under provisions of the General Conditions.
- 1.7.3.** Owners equipment:
 - 1.7.3.1.** Contractor shall verify, by actual measurement, all sizes, types of fittings, required capacities and other characteristics of existing food service equipment designated for relocation and reinstallation.
 - 1.7.3.2.** Contractor shall make all arrangements necessary to load stored equipment onto Contractors vehicles, deliver to project site, and install as required, at no additional cost to Owner.

1.8. WARRANTY

- 1.8.1.** Provide ten year manufacturer's warranty under provisions of Section 01 7719.
- 1.8.2.** Warranty: Include coverage of scheduled equipment, including disconnection of defective unit, and connection of replacement unit.

2. PART 2 - PRODUCTS

2.1. COOLER/FREEZER SYSTEM

- 2.1.1.** Manufacturer: Kolpak, <http://www.kolpak.com> or equal
- 2.1.2.** Type: Interior combination walk-in cooler/freezer
- 2.1.3.** Size: Approximately 32 feet 10 inches x 19 feet 9 inches x 8 feet 6 inches high
- 2.1.4.** Wall/Roof Panel Construction:
 - 2.1.4.1.** Thickness: 4 inches
 - 2.1.4.2.** Insulation material: Foamed-in-place polyurethane
 - 2.1.4.2.1.** Flame Spread: Maximum 25 per ASTM E 84.
 - 2.1.4.2.2.** Smoke Generation: Maximum 450 per ASTM E 84.
 - 2.1.4.2.3.** CFC Criteria: Comply with 1987 Montreal Protocol, meeting 1998 CFC standards reducing current CFC usage by 60 % minimum.
 - 2.1.4.3.** Facing: 0.042 inch thick aluminum, Stucco finish, both interior and exterior surface
- 2.1.5.** Door Construction:

- 2.1.5.1.** Type: Swing, Hinged
- 2.1.5.2.** Size: 34 inches x 78 inches
- 2.1.5.3.** Hardware:
 - 2.1.5.3.1.** Spring Loaded Hinges, with closer.
 - 2.1.5.3.2.** Cylinder latch with provision for padlocking and safety release mechanism.
 - 2.1.5.3.3.** Threshold: Provide stainless steel threshold/door anchor with heater cable.
 - 2.1.5.3.4.** Provide polyurethane sill sweep.
- 2.1.5.4.** Finish: Match wall panels.
- 2.1.6.** Floor Insulation Construction:
 - 2.1.6.1.** Type: Concrete wearing slab over insulation fill.
 - 2.1.6.2.** Insulation thickness: 4 inch urethane.
 - 2.1.6.3.** Coving: Provide NSF approved detail for wall floor edge joint, utilizing sealant and metal wall anchor.
- 2.1.7.** Accessories:
 - 2.1.7.1.** Partition: Insulated, 4 inch thick, located as shown on drawings.
 - 2.1.7.2.** Provide pressure relief port.
 - 2.1.7.3.** Provide winter control and crankcase heater.
 - 2.1.7.4.** Provide end and edge caps at all corners, finish to match wall panel.
 - 2.1.7.5.** Provide winter control and crankcase heater.
 - 2.1.7.6.** Provide free standing stainless steel shelving, wire type, 20 inch in width, 4 tiers high.
- 2.1.8.** Refrigeration System:
 - 2.1.8.1.** Type: Self Contained
 - 2.1.8.2.** Mounting: Remote Pad Mount
 - 2.1.8.3.** Freezer Series: Kolpak Model PR444L
 - 2.1.8.3.1.** Horsepower 4 HP
 - 2.1.8.3.2.** Voltage: 460/3/60
 - 2.1.8.4.** Refrigerator Series: Kolpak Model PR199M
 - 2.1.8.4.1.** Horsepower: 2 HP

2.1.8.4.2. Voltage: 208/3/60

2.2. STAINLESS STEEL

2.2.1. Materials:

- 2.2.1.1.** Stainless Steel: Type 304, 18-8, gage as shown on drawings, No. 4 finish unless noted otherwise.
- 2.2.1.2.** Galvanized Steel: Per ASTM A 653, G90 finish, extra smooth finish.
- 2.2.1.3.** Sound Deadening Coating: hard drying mastic, complying with applicable fire resistivity criteria.

2.3. OTHER PRODUCTS - GENERAL

- 2.3.1.** Provide rough - in hardware, supports and connections, attachment devices, closure trim, and accessories as necessary for a complete and functioning food service installation.

2.4. STAINLESS STEEL FABRICATIONS

- 2.4.1.** Stainless Steel Fastenings and Fittings: Exposed bolt heads will not be acceptable. Provide, when unavoidable, screws with countersunk flat heads at visible or accessible surfaces. Use concealed fastenings where possible.
 - 2.4.1.1.** Rivets of any kind are not acceptable.
 - 2.4.1.2.** Butt joints made by riveting straps under seams and filling with solder are not acceptable.
- 2.4.2.** Form edges smooth. Fabricate sheet material for work surfaces, facings, shelves, and drainboards of straight lengths in one continuous sheet when not over 12 feet in length.
 - 2.4.2.1.** All seams and joints shall be welded, one piece construction. All seams shall be ground smooth and finished to blend with adjacent surface.
 - 2.4.2.2.** Provide 1/2 inch minimum radius at all horizontal and vertical corners, coved at intersections unless noted otherwise.
 - 2.4.2.3.** Provide galvanized steel reinforcement beneath all tops, with cross braces located at maximum 30 inches on center. Close ends of all open end channels or hat sections.
 - 2.4.2.4.** Provide bull nose roll front edge, 2 inch drop, unless noted otherwise.
 - 2.4.2.5.** Provide beveled face backsplash, 2 inch projection, unless noted otherwise.
- 2.4.3.** Isolate rotating or reciprocating machinery to prevent noise and vibration.
- 2.4.4.** Provide cutting and patching of items of this Section required for the installation of other services.
- 2.4.5.** Grind welds of stainless steel smooth and flush; polish to match adjacent surfaces.
- 2.4.6.** Cut and drill components for service outlets and fixtures.

- FOOD SERVICE EQUIPMENT
11 40 00 - 5

3.4. DEMONSTRATION

- 3.4.1.** At completion of work, provide qualified and trained personnel to demonstrate operation of each item of equipment and instruct Owner in operating procedures and maintenance.
- 3.4.2.** Submit operation and maintenance data prior to demonstration.
- 3.4.3.** Schedule demonstration minimum two weeks in advance.
- 3.4.4.** Demonstrate equipment to familiarize Owner on planned operation and maintenance, including periodic preventative maintenance measures required. Include explanation of service requirements and simple on - site service procedures, as well as information concerning name, address, and telephone number of qualified local source of service.
- 3.4.5.** Individual performing demonstration must be fully knowledgeable of all operating and service aspects of equipment.
- 3.4.6.** Provide written report of demonstration to Architect outlining equipment demonstrated and malfunctions or deficiencies noted. Identify individuals present at demonstration.

END OF SECTION

SECTION 12 24 00

ROLLER SHADE

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Roller shade systems.

1.2. SUBMITTALS

- 1.2.1.** Submit manufacturers data, samples, and certificates of flammability under the provisions of Section 01 33 00.

- 1.2.2.** Product Data: Manufacturer's data sheets on each product to be used, including:

- 1.2.2.1.** Preparation instructions and recommendations.

- 1.2.2.2.** Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.

- 1.2.2.3.** Storage and handling requirements and recommendations.

- 1.2.2.4.** Mounting details and installation methods.

- 1.2.3.** Shop Drawings:

- 1.2.3.1.** Provide shop drawings of all installations, including mounting, relationship to adjacent materials, component profiles, fastening methods, assembly methods, joint details, accessory listings, and schedule of finishes.

- 1.2.3.2.** Provide operational clearances, wiring diagrams and relationship to adjacent work.

- 1.2.3.3.** Where directed by Architect, prepare shop drawings on Autocad format using base sheets provided electronically by the Architect.

- 1.2.4.** Window Treatment Schedule: Provide all treatments, use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.

- 1.2.5.** Selection Samples: For each finish product specified, one set of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.

- 1.2.5.1.** Provide complete color range of specified product series for Architects color selection. Submit fabric swatches in 4 x 4 inch minimum dimension.

- 1.2.5.2.** Following selection, provide 3 samples of each selection in size directed by Architect.

- 1.2.6.** Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements, shade cloth sample and aluminum finish sample as selected. Mark face of material to indicate interior faces.

- 1.2.7.** Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

1.3. QUALITY ASSURANCE

- 1.3.1.** Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years experience in manufacturing products comparable to those specified in this section.
- 1.3.2.** Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section.
- 1.3.3.** Fire-Test-Response Characteristics: Passes NFPA 701-99 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.
- 1.3.4.** Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, and ATCC9645.
- 1.3.5.** Mock-Up: Provide a mock-up (manual shades only) of one roller shade assembly for evaluation of mounting, appearance and accessories.
 - 1.3.5.1.** Locate mock-up in window designated by Architect.
 - 1.3.6.** Do not proceed with remaining work until, mock-up is accepted by Architect.

1.4. DELIVERY STORAGE AND HANDLING

- 1.4.1.** Deliver to and store products on site in conformance with Section 01 60 00.
- 1.4.2.** Do not deliver window treatments until interior finish work is complete and painted surfaces are fully cured. Do not deliver drapery fabrics until rods are in place and ready for draperies to be hung.

1.5. WARRANTY

1.5.1. Roller Shade Hardware, Chain and Shadecloth (except EcoVeil™): Manufacturer's standard non-depreciating twenty-five year limited warranty.

1.5.1.1. EcoVeil standard non-depreciating 10-year limited warranty.

1.5.2. Roller Shade Installation: One year from date of Substantial Completion, not including scaffolding, lifts or other means to reach inaccessible areas.

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under the provisions of Section 01 60 00.

2.2. ROLLER SHADE SYSTEM

2.2.1. Manufacturer: Mecho Shade Systems, <http://www.mechoshade.com>.

2.2.2. Type: Manual roll down shade.

2.2.2.1. Type 1: Manual operating, chain drive, sunscreen roller shades in all exterior windows of rooms and spaces shown on the Drawings.

2.2.3. Series: Mecho 5 Series

2.2.3.1. Provide brackets and drive extension as required for application shown on drawings. Provide extensions for drive in Scenery shop that are 4'-6" above finished floor.

2.2.4. *Fabric:*

2.2.4.1. Type 1: Visually Transparent Single-Fabric Shadecloth: MechoShade Systems, Inc., EuroVeil "5300" Series: 0.010 diameter (0.254 mm) non-raveling vinyl/polyester yarn, fabric thickness 0.025 inches (0.635 mm), color as selected from manufacturer's standard colors..

2.2.5. Mounting: As shown on drawings.

2.2.6. Fire/Habitability Criteria

2.2.6.1. Flame Spread: Class 1 per ASTM E84.

2.2.6.2. Smoke Density: Class 1 per ASTM E84.

2.2.6.3. Listing: UL Classified and Labeled.

2.3. OTHER MATERIALS

2.3.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

- 3.1.1.1.** Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
- 3.1.1.2.** Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
- 3.1.1.3.** In the event of discrepancy, immediately notify the Architect.
- 3.1.1.4.** Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. SHADE INSTALLATION

- 3.2.1.** Install in accordance with the manufacturers instructions.
- 3.2.2.** Securely attach brackets to studs or backing and install level to full length of window frame or pocket.

3.3. ADJUSTING AND CLEANING

- 3.3.1.** Clean all treatments of loose thread, lint, and dust.

END OF SECTION

**SECTION 21 11 00
FIRE PROTECTION**

PART 1 - GENERAL:

1.01 GENERAL

- A. This section covers water based fire protection systems, materials, and equipment.

1.02 SECTION INCLUDES

- A. Fire Protection Piping
- B. Fire Protection Fittings
- C. Fire Protection Specialties
- D. System Drains

1.03 WET-PIPE FIRE SPRINKLER SYSTEM

- A. Design, furnish and install a fully automatic wet pipe sprinkler system as an extension of the existing system throughout all areas of remodel and expansion construction as indicated on the drawings.
- B. The fire sprinkler system shall include all items of a minor nature necessary to complete the installation.
- C. The following items are depicted in the drawings:
 - 1. Design criteria.
- D. The design shall be based on hydraulic calculations for the hazard occupancies noted on the drawings or as determined by local authorities. The hydraulic calculations shall provide a minimum of 5 psi or 10 percent (whichever is greater) "cushion" between the system demand and the available water supply. In addition, a 5 psi fixed pressure loss shall be included in the hydraulic calculations at the base of the sprinkler riser for a possible future backflow preventer installation.
- E. Use the drawings for reference only. Any items such as coverage of the building, pipe sizes, head spacing and any other requirements of the authorities having jurisdiction shall be included, whether specifically shown on the drawings or mentioned in the specifications or not.
- F. The design of the sprinkler system shall comply with NFPA-13, 1999 Edition, 2006 IBC, Chapter 9, and the requirements specified hereinafter.

1.04 RELATED SECTIONS

- A. Section 23 05 00 - Basic Mechanical Materials and Methods
- B. Section 28 31 00 - Communications: Fire Alarm and Detection Systems

1.05 REFERENCES

- A. National Fire Protection Association (NFPA):
 - 1. NFPA-13 Installation of Sprinkler Systems, 1999.
 - 2. NFPA-14 Installation of Standpipe and Hose Systems, 2000.

3. NFPA-20 Installation of Centrifugal Fire Pumps, 1999.
4. NFPA-22 Water Tanks for Private Fire Protection, 1998.
5. NFPA-24 Installation of Private Fire Service Mains and Their Appurtenances, 1995.
6. NFPA-25 Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems, 1998.
7. NFPA-230 Fire Protection of Storage, 1999.
8. NFPA-291 Recommended Practice for Fire Flow Testing and Marking of Fire Hydrants, 1995.

B. Factory Mutual Research Corporation (FM):

1. Loss Prevention Data for the Fire Service
2. FM Approval Guide, Latest Edition

C. Underwriters Laboratories Inc. (UL):

1. UL Fire Protection Equipment Directory, Latest Edition

D. International Fire Code, 2003.

E. International Building Code, 2006.

1.06 PERMITS AND FEES

- A. The Fire Protection Contractor shall secure and pay for, as part of this Contract, any permits, fees, changes, taxes, or inspections required for the installation of the sprinkler system over and above the permit required for the entire building project.

1.07 PROJECT/SITE CONDITIONS

- A. In addition to the requirements in Section 23 05 00, take pressure readings at or near the site to verify the results of the flow test included in the design criteria. Any discrepancy observed in water pressures shall be reported immediately to the architect prior to the preparation of shop drawings.

1.08 SUBMITTALS

A. Material Data:

1. Submit copies of equipment literature in accordance with Section 23 05 00 on the following items:
 - a. Sprinkler heads - all types and escutcheons
 - b. Pipe
 - c. Fittings
 - d. Hangers and bracing materials

B. Shop Drawings:

1. Prior to fabrication of material, submit a minimum of 6 copies of full shop drawings and hydraulic calculations to the Architect.
2. Shop drawings and calculations shall be submitted to the authority having jurisdiction. Approved shop drawings shall be maintained at the construction site.

Submit an additional copy of the approved shop drawings and hydraulic calculations to the architect.

PART 2 - PRODUCTS:

2.01 GENERAL

- A. Materials and equipment shall conform to the requirements of the Underwriters Laboratories, Inc. (UL) or the Factory Mutual Research Corporation (FM) for systems of the type indicated. The contractor shall submit proof that the items furnished under this specification conform to such requirements. The UL label or seal, or listing in the UL Fire Protection Equipment Directory will be acceptable evidence that the items conform to the requirements of UL. The FM label or seal, or listing in the FM Approval Guide will be acceptable evidence that the items conform to the requirements of the FM.
- B. All materials, equipment and system components shall be new and installed in accordance with the manufacturer's recommendations, the UL listing and/or FM approval guide.
- C. The naming of manufacturers in these specifications shall not be construed as eliminating the materials, products or services of other manufacturers and suppliers providing approved equivalent items.
- D. The dimensions and ratings of equipment herein specified, or indicated on drawings, are intended to establish the desired outlines and characteristics of such equipment. Minor deviations will be permitted to allow manufacturers' equipment accommodation. Deviations of physical dimensions of equipment, which impact upon space allocated to work areas of other equipment, shall not be permitted.

2.02 FIRE PROTECTION PIPING

- A. Pipe shall be new black or galvanized steel, designed for 175 psi working pressure, conforming to the ASTM specifications, and have the manufacturer's name and brand, along with the applicable ASTM standard, marked on each length of pipe.
 - 1. Standard Wall: Overhead pipe shall be black steel and must comply with ASTM A 795 for black pipe, and hot dipped zinc coated galvanized welded and seamless steel pipe. Galvanized pipe shall be used for any exposed canopies or construction. Dimensions for all overhead pipe must be in accordance with the American Standard for Wrought Steel and Wrought Iron Pipe ANSI B36.10 for pressure up to 300 psi. Schedule 40 pipe is considered "standard wall" pipe. Schedule 30 pipe is acceptable in 8-inch sizes and larger. Pipe ends shall be welded, threaded or cut grooved.
 - 2. Thin Wall: Overhead pipe may be UL listed, FM approved, and compliant with NFPA-13, thin wall pipe approved for pressures up to 300 psi. Pipe shall meet ASTM A795, Type E, Grade A, and/or ASTM A-135, Grade A. Allied Dyna-Flow and Dyna-Thread are approved. Allied Dyna-Flow ends shall be roll grooved or welded in accordance with NFPA 13. Allied Dyna-Thread ends shall be joined by screwed joints in accordance with ANSI B 2.1 (ANSI b 1.20.1 - 1983) per NFPA 13, or welded joints in accordance with ANSI 31.1 as amended by NFPA 13 or approved mechanical fittings.
 - 3. Pipe less than schedule 40 shall not be threaded or cut grooved.

4. All sprinkler drain and test piping, fire department connection piping, etc., exposed to weather, shall be galvanized.
5. Steel pipe shall have a corrosion resistance ratio (C.R.R.) equal to greater than that of schedule 40 pipe (1.00).

2.03 FIRE PROTECTION FITTINGS

- A. Screwed fittings shall be cast iron, 125 pound class, black, and in accordance with ANSI B 16.4 or malleable iron, 150 pound class, black and in accordance with ANSI B 16.3.
- B. Flanged fittings shall be cast iron, short body, Class 125, black and in accordance with ANSI B 16.1. Gaskets shall be full-face of 1/8-inch minimum thickness red sheet rubber. Flange bolts shall be hexagon head machine bolts with heavy semi-finished hexagon head nuts, cadmium plated, having dimensions in accordance with ANSI B 18.3.
- C. Weld fittings shall be steel, standard weights, black, and in accordance with ANSI B 16.9, ANSI B 16.25, ANSI B 16.5, ANSI B 16.11, and ASTM A 234.
- D. Grooved couplings and mechanical fittings shall be ductile iron in accordance with ASTM A-536, 350 psi working pressure. The couplings' gasket material shall be Grade "E" EPDM. Grooved couplings and mechanical fittings shall be listed by UL and approved by FM for wet and dry (oil free air) sprinkler systems. Victaulic FireLock or equivalent.
- E. Fittings shall be suitable for use in sprinkler systems and defined in NFPA 13. Fittings exposed to outside atmosphere shall be galvanized. Bushings shall not be used.
- F. Plain end fittings with ductile iron or malleable iron housing, pressure responsive gasket, and hardened steel locking lugs with retainers; Victaulic FIT, Gruvlok or approved equal.
- G. Push-on or "roustabout" fittings shall not be used.
- H. Grooved fittings, valves and pipe shall be joined using rubber gasketed couplings produced by the manufacturer of the fitting and/or valves. Gaskets shall be listed for use for the appropriate application. Rigid grooved couplings shall be used where horizontal piping runs require more than two couplings per run.
- I. Couplings may be of the rolled groove type or the mechanical locking type, and they shall be dimensionally compatible with the pipe. Pipe end preparation for the mechanical locking type couplings shall be in accordance with the manufacturer's recommendations.

2.04 FIRE PROTECTION SPECIALTIES

- A. Sprinkler Heads:
 1. Automatic sprinklers shall be standard automatic closed type with a minimum ½ inch nominal size orifice. Temperature ratings of fusible elements shall be in accordance with NFPA-13. In areas of above normal temperatures, high temperature sprinklers suitable for the temperature conditions involved shall be provided.
 2. Sprinklers shall be Viking, Grinnell, Star, Reliable, Central or approved equal, upright, pendent, or sidewall.
 3. In areas with suspended, gypsum board or finished ceilings, recessed pendent

type glass bulb sprinkler heads with satin chrome finish including (2) piece adjustable escutcheons with matching finish shall be provided.

4. Unless otherwise indicated in the drawings, all unfinished spaces and spaces without suspended, gypsum board or finished ceilings shall be protected with upright sprinkler heads with brass finish.
5. Provide protective wire guards for all heads which might be subject to physical damage, including all heads which are seven (7) feet or less above the floor.
6. Furnish spare automatic sprinklers, representative of and in proportion to the number of each type and temperature rating of the sprinklers installed. They shall be packed in a suitable metal cabinet in accordance with NFPA-13. The contractor shall furnish at least one special sprinkler head wrench for each spare head cabinet or for each sprinkler type, whichever is greater.
7. Higher temperature heads shall be installed where location dictates (i.e., near unit heaters, blowers, ovens, etc.).
8. Corrosion-proof sprinklers shall be installed in all areas exposed to corrosive conditions.
9. When used, sidewall sprinkler heads shall be provided with satin chrome finish including 2 piece recessed, adjustable escutcheons with matching finish.

B. Valves:

1. All valves to be UL and FM approved 175 psig WWP.
2. Provide identification sign, enamel on metal, on all valves in accordance with NFPA-13. Each sign shall have the area served specified on the back of the sign.
3. All test and drain valves must be installed within seven feet of the floor in accessible locations (chases, pipe shafts, etc.) as required by code and to provide economical maintenance services. When provided within walls, access panels shall be provided. Access panels shall have equivalent fire ratings. Ceiling area locations shall not be used for valve locations unless approved by the architect.

C. Hangers:

1. Support sprinkler piping from building structure with hangers and supports in accordance with NFPA-13. The placement and number of hangers shall be adequate to maintain the piping in a level position without sags or low points. Vertical sections of piping shall be supported at each floor level and shall be plumb with the structure. Power driven studs shall not be used.

D. System Drains:

1. Provide drain valves on system risers, valved sections, and at any other locations where 5 gallons or more trapped water occurs. Provide with brass hose connection and brass cap.
2. All drain valves shall be globe style, slow close, of appropriate size per NFPA-13. All drains shall be connected to main drain or shall spill outside building, at

grade, over splash block at a 45 degree angle. Discharge shall be located where water drained will not damage stock, equipment, vehicles, planted areas, or discharge onto public sidewalks. Drain terminations inside of the building are not acceptable except that auxiliary drains may terminate into a properly sized drain receptacle when approved by the Architect.

3. Automatic ball drips shall be UL or FM approved 3/4" cast brass in line with both ends threaded with iron pipe threads. Ball drips shall drain to outside per paragraph (2) above.

PART 3 - EXECUTION:

3.01 GENERAL

- A. The fire protection system shall be designed, fabricated and installed by a fire sprinkler contractor licensed in the State of Arizona and experienced in this type of system design and installation with a minimum five (5) years experience.
- B. Where suspended ceilings are present, the sprinkler piping shall be concealed unless otherwise noted. Notify the Architect in writing if piping cannot be concealed. Exposed sprinkler piping will not be permitted without the Architect's written approval.
- C. Locate heads 12" from a ceiling "T" on 3 sides or in center of 2 x 4 ceiling tile. Final head layout requires Architect's approval.
- D. Sprinkler head locations shall be coordinated with light fixtures and HVAC. Unless noted otherwise, priority of location is given to light fixtures and HVAC. Cutting of structural members for the passage of sprinkler piping or for pipe hanger fastenings will not be permitted without the Architect's and Structural Engineer's approval.
- E. Arrange, phase, and perform work to assure adequate services for the owner at all times.
- F. Connect new work to existing work in a neat and workmanlike manner. Where existing equipment causes an obstruction, such obstruction shall be by-passed, removed, replaced or relocated, patched and repaired. Work disturbed or damaged shall be replaced or repaired to its prior condition.
- G. Fire Protection Contractor shall:
 1. Carry on his work with sufficient manpower and supervision so as to not impede the work of other trades and accomplish the timely completion of the construction of the building.
 2. Provide a job foreman at the job at all times during its progress, with authority to act for and to supervise the installation of the work and to consult with other trades as to the proper execution and conduct of the work.
 3. Provide all necessary rigging, scaffolding, tools, tackle, and labor which may be necessary for the completion of the work.
 4. Install and connect all appliances and equipment with acceptable engineering practice and in accordance with the manufacturers' instructions and recommendations.
 5. Avoid cutting and/or drilling of the work of other trades, finished or otherwise.

Avoid sprinkler lines from passing through grouped refrigeration lines and conduit. Cutting or drilling of structural elements of the building or air handling ducts shall be approved by the Architect and Structural Engineer in writing. Patching, repairing, and painting of concrete, masonry, metal, tile, plaster, wood flooring, etc. as necessary to make good after such cutting or drilling is the responsibility of the Fire Protection Contractor.

6. Remove to the site dumpsters refuse materials or rubbish caused by this work. At the completion of the work, remove all surplus materials, tools, etc., and leave the premises clean.
 7. Participate in all job site safety meetings and cause his workers to observe safety work rules established for the construction.
- H. In determining sprinkler location, special attention shall be given to sprinkler clearance to avoid obstruction of discharge patterns, particularly with respect to duct work, structural supports, light fixtures, refrigeration coils in coolers/freezers and grouped refrigeration piping or electrical conduits passing below sprinklers heads.

3.02 BRACING AND CLAMPING

- A. Piping above grade shall be braced as required in NFPA-13 and State Fire Marshal requirements.
- B. All sprinkler piping must be supported from building structure and only approved types of hangers shall be used.
- C. Below steel deck and joist construction, use beam clamps to hang piping from top chord of joist. Do not hang piping from bottom chord, or bridging.

3.03 SYSTEM FLUSHING

- A. Before connecting sprinkler system to underground supply connections, each supply connection shall be flushed out thoroughly in accordance with requirements of NFPA-13.

3.04 CEILING AND WALL SLEEVES AND PLATES

- A. Sleeves are to be installed at all pipes passing through masonry floors or walls. Install chrome finished ceiling and wall plates wherever exposed sprinkler piping passes through finished ceilings or walls.

3.05 TESTS

- A. Perform hydrostatic tests as required by NFPA-13 and 24. Hydrostatically test piping system at 200 PSI for not less than two (2) hours. Upon completion of test and when satisfactory results have been obtained, certify in writing that all required tests have been performed and that approval of system has been obtained from authorities having jurisdiction over work. The tests shall be performed in the presence of Arizona State Fire Marshal inspector, General Contractor and Architects representative. Furnish the Architect/Engineer with 3 copies of the certificate.

3.06 DOCUMENTATION

- A. Furnish two copies of NFPA-25, 1998 Edition - Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems to the owner's service maintenance personnel as

directed by the Architect/Engineer.

- B. Furnish a complete set of "as-built" drawings in a waterproof bag or container at the location of the spare sprinkler head box.
- C. Furnish a permanently marked weatherproof metal hydraulic calculation data information plate affixed to the sprinkler riser. The sign shall include the following information:
 - 1. Location of the design area or areas.
 - 2. Discharge densities of the design area or areas.
 - 3. Required flow and residual pressure demand at the base of riser.
 - 4. Hose stream demand included in addition to the sprinkler demand.

3.07 MATERIALS DELIVERY

- A. The Fire Protection Contractor shall be responsible for the safe and secure storage of materials on job site, including furnishing of any storage facilities or structures required.
- B. The Fire Protection Contractor shall be responsible for on-site handling of materials and equipment.

3.08 JOB CONDITIONS

- A. Protect all unfinished work to prevent damage and furnish protection of all surrounding areas, where necessary.
- B. All Fire Protection Work shall be protected against damage by frost, dirt, water, chemicals, and mechanical means during the course of construction.
- C. Leak Damage: The Contractor shall be responsible during the installation and testing periods of the sprinkler system for any damage to the work of others, to the building or its contents caused by leaks in any equipment, by unplugged or disconnected pipes or fittings, or by overflow, and shall pay for the necessary replacements or repairs to work of others damage by such leakage. Water shall not be introduced into the system during conditions where there is danger of freezing.

3.09 GUARANTEE

- A. The Fire Protection Contractor shall guarantee to repair or replace any defect in material, equipment or workmanship for a period of one (1) year beginning with the date of final acceptance by the Architect. Such date will be established by written communication of Architect. The Fire Protection Contractor shall be responsible during the design, installation, testing, and guarantee periods for any damage caused by the Fire Protection Contractor's work, materials, or equipment.
- B. The Fire Protection Contractor shall provide emergency repair service for the sprinkler system within four (4) hours of a request for such service by the Owner during the warranty period. This service shall be available on a 24-hour per day, 7-day per week basis.

END OF SECTION

**SECTION 22 40 00
PLUMBING**

PART 1 - GENERAL:

1.01 WORK INCLUDED

- A. Plumbing Fixtures
- B. Plumbing Specialties
- C. Plumbing Equipment

1.02 RELATED SECTIONS

- A. Section 23 05 00 - Basic Mechanical Materials and Methods
- B. Section 23 07 00 - Mechanical Insulation
- C. Section 23 20 00 - Building Services Piping
- D. Section 21 11 00 - Fire Protection

1.03 QUALITY ASSURANCE

- A. The plumbing equipment schedules are shown on the drawings. The following is a list of additional equipment approved for use on this project:
 - 1. SINK: Eljer, Kohler American Standard, Crane, Just, Elkay, Designers Choice
 - 2. ROOF DRAIN, FLOOR DRAIN, SANITARY FLOOR DRAIN, CLEANOUTS: Josam, J.R. Smith, Ancon, Rockford, Wade, Zurn, Watts
 - 3. FAUCETS: Symmons, Delta, Chicago Faucet Co., T&S Brass and Bronze Works, Cambridge Brass, Powers, Bradley, Kohler, Sloan
 - 4. PUMPS: Taco or by prior approval
 - 5. TRAP AND SUPPLIES: McGuire, Brass Craft, Eastman, CS&B
 - 6. TRAP PRIMER VALVES: Precision Plumbing Products, Mifab
 - 7. HOSEBIBBS: Chicago, Woodford, Mifab, Nibco

1.04 SUBMITTALS (Also refer to Section 23 05 00)

- A. Before beginning work, provide shop drawings on the following items:
 - 1. Plumbing fixtures
 - 2. Drains
 - 3. Pumps
 - 4. Plumbing Specialties
 - 5. Other items as directed by the Owner

PART 2 - PRODUCTS:

2.01 FIXTURES

- A. General:
 - 1. Furnish and install all plumbing fixtures as indicated below. All fixtures shall be white and be of the same manufacturer unless otherwise noted. All fixtures to have accessible stops and all faucets shall have renewable seats, discs, and metal indexed handles. All fixture trim shall be chrome plated and by the same manufacturer unless otherwise noted.

B. Cleanouts:

1. Floor cleanouts in finished floors shall be Wade W-6000-Z series with nickel bronze cover and frame, adjustable top, and tapered bronze plug. Cleanouts in concrete floors shall be provided with standard tractor type covers. Cleanouts in carpeted areas shall be provided with carpet flange top. Cleanouts in tile floors shall be provided with square or round tops for tile or terrazzo as required.
2. Wall cleanouts shall be Wade W-8560-E series with 8480-R. Cast iron tee with countersunk brass plug drilled for cover screw and round stainless steel access cover.
3. Exterior cleanouts in non-traffic areas or pedestrian light-traffic areas shall be Wade W-6000-Z-179 series with nickel bronze cover and frame, adjustable top, tapered bronze plug, and vandal proof top. Set in an 18" cube of concrete.
4. Exterior cleanouts in traffic areas shall be Wade W-8300-MF with W-8550-B series. Access housing with adjustable anchor flange and extra-heavy secured scoriated ductile iron cover set in an 18" cube of concrete. With cast iron cleanout ferrule with spigot outlet and raised tapered brass plug.
5. Provide membrane clamps for cleanouts installed in surfaces have waterproofing membranes installed.

2.02 PLUMBING SPECIALTIES

- A. Manhole covers for the grease interceptor shall be replaced with a 24" gasketed, ductile iron manhole cover filled with concrete such that it is flush with the finished floor of the loading dock.

PART 3 - EXECUTION:

3.01 GENERAL

- A. All changes in the plumbing work made after letting of the contract, in order to comply with the applicable codes or requirements of the plumbing inspectors, Health inspectors, Utility Regulatory Agency and similar shall be made without additional cost to the Owner.
1. Should the Plumbing Contractor or any of the Subcontractors perform any work that does not comply with the requirements of the applicable Building Codes, State Laws, Local Ordinances and Industry Standards, he shall bear all costs arising in correcting the deficiencies, as approved by the Engineer.

3.02 INSTALLATION

- A. Secure each water line where it penetrates partitions to serve fixtures, shower arms, hose bibbs and similar items. Wrap all piping in block walls or penetrating concrete with 10 mil polyethylene tape or covering with polysleeve.
- B. Set hose bibbs 18 inches above finished grade, unless otherwise indicated. Adjust height as required to line-up bottom or top edge of wall hydrants with masonry seams where applicable. Grout water-tight any wall penetrations with non-shrinking grout. Wall hydrants shall be installed level and square with face flush with finished wall face. Thoroughly clean after installation.

- C. Seal fixtures to walls, floors, and counters using a sanitary type, one part, mildew resistant white 100% silicone sealant.
- D. Cleanouts shall be installed in accessible locations. Wall cleanout access covers shall be installed above bottom course of tile when installed in tiled walls. Floor and ground cleanouts shall be installed with covers set flush to finished grade or floor.
- E. During construction, floor drains, fixtures, and equipment shall be provided with adequate protection against damage and sealed against entrance of construction debris. Floors shall not be washed into floor drains as part of the construction clean-up process.

3.03 PLUMBING SPECIALTY INSTALLATION

- A. Provide trap primers on floor drains where noted with approved trap primer valve connections. Provide ball valve for isolation of trap primer valve. Provide access doors as required. When possible, trap primer valves shall be located behind the same access panel as shock absorber. Install trap seal primer valves with valve outlet piping pitched down toward drain trap a minimum of 1/8" inch per foot (1 percent) and connect to floor drain body, trap, or inlet fitting.

3.04 FLASHINGS

- A. All vent stacks passing through the roof shall be flashed with 4 lb. per square foot lead sheets extending around the pipe 8" in all directions at the roof surface and turned down 2" into the pipe opening.
- B. Provide 4 lb. per square foot lead sheets for all roof drains and overflow roof drains (minimum 24" x 24" cut for drain and clamped at collar). Coordinate installation with roofer.

END OF SECTION

SECTION 23 05 00
BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL:

1.01 GENERAL

- A. This section covers basic materials and methods which may be common to one or more subsequent sections.

1.02 WORK INCLUDED

- A. Mechanical Sound, Vibration, and Seismic Control
- B. Mechanical Identification
- C. Motors
- D. Access Panels and Doors

1.03 RELATED SECTIONS

- A. Section 01 30 00 – For submittals
- B. Section 01 70 00 – Record drawings and O&M manuals
- C. Section 05 45 00 – For mechanical supports
- D. Section 09 90 00 – For field painting of equipment and piping, other than for identification.
- E. Section 13 48 00 – For sound and vibration control of structure
- F. Section 40 92 49 – Adjustable frequency motor control
- G. Section 26 00 00 – For motor starters

1.04 SYSTEM DESCRIPTION

- A. The work under this section of the specification shall include all systems as shown on drawings or specified herein. This shall include all items of a minor nature necessary to complete the installation whether specifically mentioned in the contract documents or not.
- B. Drawings are diagrammatic. Dimensions given in figure on the plans shall take precedence over scaled dimensions and all dimensions, whether given in figures or scaled, shall be verified in the field.
- C. No ductwork or piping shall be shop fabricated before clearances are field verified. Offsets and transitions required because of interferences encountered in the field shall be a part of this contract and shall be shown on record drawings.

1.05 PROJECT/SITE CONDITIONS

- A. Before submitting a bid, carefully study the Civil, Architectural, Electrical and Mechanical drawings. Make a careful examination of the premises and any existing work. Determine, in advance, the methods of installing and connecting the apparatus, the means to be provided for getting the equipment into place, and become thoroughly familiar with all of the requirements of the contract.

1.06 REFERENCES

- A. All work shall be performed in accordance with all codes, laws, rules and regulations of all National, County, State and Local authorities having jurisdiction over the premises. This shall include, but not be limited to, the latest editions of the Uniform Plumbing Code, the

International Mechanical Code, the International Building Code, State or local Board of Health, Federal and State Environmental protection regulations, International Energy Conservation Code and Utility Regulatory Agencies, Occupational Safety and Health Act, the American Gas Association, National Fire Protection Association, and the International Fire Code. In case of differences, between codes, ordinances, specifications, or plans, the most stringent shall apply. This does not delete requirements of plans and specifications which may be in excess of code requirements.

1.07 QUALITY ASSURANCE

- A. The mechanical systems have been designed around the makes and sizes of equipment named on the drawings or elsewhere in the specifications. Other makes of equipment named in the specifications, shown on the drawings, or approved by the Architect as outlined in Division 01, may be furnished at the contractor's option. Equipment furnished must have equivalent capacity, the same electrical characteristics, substantially the same physical dimensions, and can be installed in the space available with ample working space around it. Any extra costs resulting from equipment substitution shall be at no cost to the owner.
- B. Where possible, all items of the same type (i.e. pumps, fans, fixtures) shall be by the same manufacturer.
- C. Where instructions on installation are not included in these specifications or on the plans, the manufacturer's instructions shall be followed.

1.08 SUBMITTALS

- A. See Section 01 30 00 for general submittal requirements. Refer to subsequent sections for other requirements.
- B. Before beginning work and prior to placing orders, submit six copies of shop drawings or literature in 3-ring binders with indexed dividers (separating groups of similar items) on fixtures, materials, and equipment to be furnished. Each cut-sheet or shop drawing shall have options and selections highlighted or otherwise clearly identified. Each cut-sheet or shop drawing shall include: mark indicated on drawings, manufacturer with address and phone number, model number, capacities, ratings, dimensions, electrical characteristics, trim, and accessories. Each cut sheet or shop drawing shall be an original from the manufacturer or a clean and clear black and white copy. Information shall be printed on one side only of each page. Each binder shall include a cover sheet indicating the project title, Architect, General Contractor's name, and contractor's name, address, and phone.
- C. Submittals not in the format of paragraph B or illegible will be returned. Separate complete submittals for Plumbing, HVAC, and Fire Protection may be submitted. HVAC control drawings may be submitted separate from the rest of the HVAC submittals.
- D. Resubmittals may be issued in 8-1/2"x11" format with three holes punched for insertion into original three ring binders. In addition to the requirements outlined above, resubmittals shall be marked as "resubmittal" on each page.
- E. Before submitting any equipment for review, determine that such equipment will fit satisfactorily into the space allotted to it.
- F. When equipment or materials submitted differ from that specified or when local conditions necessitate an arrangement of equipment or materials different from that indicated on the

drawings, submit for review shop drawings showing proposed rearrangement before installation. Any deviations from plans and specifications shall be called to the attention of the Architect in writing.

- G. Voltage and phase of motors furnished under this section shall be as indicated on the electrical drawings. Verify electrical characteristics with electrical drawings before final ordering of equipment.
- H. Submittals will be checked for general compliance only and should not be relied on for review of quantities, fabrication methods, safety precautions, or electrical or physical coordination. Requirements of contract documents are not limited, waived, or superseded by submittal review.

1.09 FEES, PERMITS & INSPECTIONS

- A. The Architect-Owner shall secure and pay for all permits and fees including, but not limited to: water meters, fire line connection charges, sewer connection fees, and other mechanical connection charges required for the installation of the mechanical systems. The Contractor shall arrange for all inspections and secure all approvals required for work.

1.10 COOPERATION AND WORK PROGRESS:

- A. Perform work so that progress of project, including work of other Trades is not delayed.
- B. Coordinate work of this Section with work of other Sections to complete work as soon as conditions permit and to minimize interruptions of building functions. Assume additional costs incurred due to lack of or improper coordination with work of other Sections.
- C. Coordinate exact mounting arrangement and location of equipment shown on Drawings. Allow for proper space requirements for equipment access, operation and maintenance. Particular attention shall be given to group installations. If insufficient space or conflict with work of other Sections will prevent proper installation, access, operation, or maintenance of shown equipment, immediately notify Architect and do not proceed with this part of Contract work until directed by Architect.

PART 2 - PRODUCTS:

2.01 MECHANICAL SOUND, VIBRATION, AND SEISMIC CONTROL

- A. All equipment, piping, registers and grilles, etc., shall be installed to meet local seismic code requirements including but not limited to the following:
 - 1. Isolators under equipment shall have seismic restraint.
 - 2. Ceiling diffusers and return grilles in T-bar ceilings connected to flexible duct shall be supported from structure above.

2.02 MECHANICAL IDENTIFICATION

- A. Provide coiled plastic pipe markers for pipe identification of all exposed piping or piping above accessible ceilings. Markers used on outdoor piping shall be approved for outdoor use.
- B. Provide 2" x 3" or larger laminated black plastic nameplates with one-half inch engraved

white numbers and letters for each piece of equipment. Nameplate materials mounted outside shall be resistant to UV degradation.

- C. Approved pipe identification and engraved plastic tag manufacturers: Seton, Brimar Industries, Marking Services Inc., MIFAB.
- D. Valves shall be provided with brass valve tags stamped with valve number and identification for service.
- E. Piping Painting:
 - 1. All exposed steel piping and all equipment room piping indicated below shall be painted. Coordinate with Section 09 90 00 for painting. The color code scheme shall be as indicated in the table below. The color code is per Federal Standard No. 595A.

PIPING CONTENTS	COLOR	COLOR CODE
Fire Protection	Red	11105
Domestic Cold Water	White	17875
Domestic Hot Water	Gray	16473
Chilled Water Supply	Light Blue	15200
Chiller Water Return	Dark Blue	15102
Heating Water Supply	Yellow	13618
Heating Water Return	Orange	12473
Condensate	Gray	16357

- 2. Primer on exposed steel piping shall be iron oxide Fed Spec TT-P-664D. Second and third coats for exterior piping shall be alkyd-enamel resin Fed Spec TTP-37D and TT-E-489H Class A. The second and third coat for exposed interior steel pipe shall be semi-gloss enamel Fed Spec TT-E-508C. Installation to be per manufacturer recommendations. Note: Products specified in Section 09 90 00 shall take precedence.

2.03 MOTORS

- A. Motors shall be NEMA Premium efficiency as tabulated below and in accordance with NEMA MG 1-1998, "Motors and Generators," and IEEE 112 Test Method B. Provide motor starters and coordinate with Electrical. Motor efficiencies shall be part of each submittal for equipment with a motor.

Minimum Motor Efficiency %

HP	Open Drip-Proof			Totally Enclosed Fan-Cooled		
	1200 RPM	1800 RPM	3600 RPM	1200 RPM	1800 RPM	3600 RPM
0.75	90.2	91.0	88.5	91.0	91.7	89.5
1	82.5	85.5	--	82.5	85.5	77.0
1.5	86.5	86.5	84.0	87.5	86.5	84.0
2	87.5	86.5	85.5	88.5	86.5	85.5
3	88.5	89.5	85.5	89.5	89.5	86.5
5	89.5	89.5	86.5	89.5	89.5	88.5
7.5	90.2	91.0	88.5	91.0	91.7	89.5
10	91.7	91.7	89.5	91.0	91.7	90.2
15	91.7	93.0	90.2	91.7	92.4	91.0
20	92.4	93.0	91.0	91.7	93.0	91.0

25	93.0	93.6	91.7	93.0	93.6	91.7
30	93.6	94.1	91.7	93.0	93.6	91.7
40	94.1	94.1	92.4	94.1	94.1	92.4
50	94.1	94.5	93.0	94.1	94.5	93.0
60	94.5	95.0	93.6	94.5	95.0	93.6
75	94.5	95.0	93.6	94.5	95.4	93.6
100	95.0	95.4	93.6	95.0	95.4	94.1
125	95.0	95.4	94.1	95.0	95.4	95.0
150	95.4	95.8	94.1	95.8	95.8	95.0

- B. Motors used with adjustable frequency motor controllers shall be squirrel-cage induction type manufactured and rated for inverter duty. Efficiencies shall be as shown in paragraph A above.

2.04 ACCESS PANELS AND DOORS

- A. Provide access panel for any concealed equipment or valve requiring access. This includes any required duct and/or ceiling access for fire dampers. Access panel shall be minimum sizes required by code and be of a type compatible with ceiling or wall construction.
- B. Access doors for lined duct shall be insulated access door type. Access doors for wrapped duct shall have insulation trimmed back and insulation glued to the outside of the access door. Access doors for fire rated construction shall maintain rating of construction after installation. All access doors shall have screwdriver-operated latches.
- C. Approved access panel and door manufacturers: CESCO, Karp, and Ductmate Industries

PART 3 - EXECUTION:

3.01 GENERAL

- A. All work shall be performed by personnel and company with a minimum of three years experience in this type of work. All work shall be under the direct supervision of a competent foreman. Verification of similar work experience may be required prior to beginning work. All work shall be planned and carried out so as not to interfere with the progress of the work by other sections on the job.
- B. Locations indicated on the drawings show the arrangement desired for the principal apparatus and shall be followed as closely as possible. The work shall be laid out on the job to secure a neat arrangement, to secure the best conditions throughout, and to overcome local difficulties and interferences where encountered. Equipment shall be installed to permit access for service. All installations shall be made as recommended by the equipment manufacturers.
- C. Erect equipment and accessories in neat and workmanlike manner. All piping, ductwork, etc. shall be run parallel and at right angles to building. Align, level and adjust for satisfactory operation, install so that connecting and disconnecting of piping and accessories can be made readily and so that all parts are easily accessible for inspection, operation and maintenance.
- D. Be fully responsible for any and all damages to fixtures and equipment that results from improper handling or installation.

- E. Provide safety guards for any equipment that may present a hazard to personal safety.

3.02 TEMPORARY FACILITIES

A. Staging and Scaffolding:

1. All staging and scaffolding, exterior and interior, required to be over eight feet in height, shall be furnished, erected and maintained in safe condition for proper execution of the work.
2. Staging, Scaffolding and other temporary construction shall be rigidly built in accordance with local and state requirements. Remove from premises upon completion of work.

B. Provide temporary construction required for work as directed by Architect.

C. Hoisting Equipment and Machinery:

1. All hoisting equipment and machinery required for the placement of equipment shall be furnished, installed, operated, and maintained in safe condition.

3.03 PROTECTIVE MEASURES

- A. Protect all equipment, materials, and plumbing fixtures on the job site until project has been finished.
- B. All equipment shall be tightly covered and protected against dirt, water, chemical or mechanical injury, and theft. Insulation damaged by rain or water shall be replaced at no cost to owner. Plumbing fixtures shall be covered with heavy paper coverings after installation and shall be thoroughly cleaned after completion of the project.
- C. Any mechanical items damaged by exposure to the weather shall be replaced or refinished. Any damage or defect of work developed before final acceptance of work shall be replaced or repaired at no cost to the owner.
- D. All materials such as valves, fittings, piping, equipment, pumps, coils, etc., shall be properly protected. All duct and piping openings shall be temporarily closed at the end of each working day to prevent obstruction and damage. Open ended ducts or plenums shall not be used for storage of materials or for temporary staging during construction.
- E. At the completion of the work, equipment and materials shall be cleaned, polished thoroughly and turned over to the Owner in a condition satisfactory to the Architect.

3.04 MECHANICAL IDENTIFICATION

- A. Screw tags to equipment with pan head sheet metal screws or strap to equipment in obvious locations. Attachment methods shall be in accordance with manufacturer's recommendations. Engrave equipment designation and numbers as shown on plans and drawings on upper half of tag, leaving lower half of tag for future engraving. Tags for valves shall be attached using solid brass jack chain.
- B. Pipe markers on exposed piping shall be maximum 25'-0" on center. Pipe markers on

piping above accessible ceilings shall be maximum 6'-0" on center. Pipe markers shall indicate flow direction at every marker location (with arrows pointing away from text). Markers shall be installed per latest standards for markers. Markers shall not be required on painted piping.

3.05 PAINTING

- A. Touch-up damaged factory finishes with factory approved products in accordance with manufacturer's instructions.
- B. All surfaces to be painted shall be thoroughly cleaned of grease, dirt and oil before paint is applied. Painting materials, the application thereof, and protection of other work shall conform to the requirements of Section 09 90 00.
- C. Paint all plastic pipe exposed to sunlight with two coats of white latex paint.
- D. Paint all visible sheet metal ductwork behind grilles and registers flat black.
- E. Ductwork exposed on roof shall be painted white. Coordinate with Section 09 90 00.
- F. All uninsulated steel piping either exposed to weather or visible in equipment rooms shall be painted white.

3.06 CUTTING & PATCHING

- A. Provide all openings through walls, floors and the roof necessary for the installation of the work under this Section. Openings shall be neatly cut with any damage to the building repaired and repainted.
- B. Layout all chases and openings required, and furnish and set all sleeves, concrete inserts and anchor bolts required for the installation of work under this Division.

3.07 MECHANICAL PROVISIONS

- A. Extend all inaccessible oil or grease fittings by copper tubing to readily accessible locations.

3.08 TESTS AND ADJUSTMENTS

- A. Notify the Architect of readiness to perform a test 24 hours in advance and all tests shall be performed in the presence of the Architect's representative. Any defective material and/or equipment shall be repaired, adjusted and/or replaced by like new materials and/or equipment before acceptance.
- B. All items such as valves, gauges, traps, strainers, etc., which may be damaged by the test pressure shall be removed before the tests are made and shall not be replaced until the tests have been approved.
- C. Furnish all pumping equipment tools, instruments, equipment, and temporary connections required for tests.
- D. All defects which develop under tests shall be repaired promptly and the tests repeated. No caulking of screwed joints, cracks or holes will be permitted. Leaks in screwed joints

shall be repaired by replacing the pipe or the fittings or both with new material. Leaks in copper fittings shall be repaired by melting out the joint, thoroughly cleaning both parts and resoldering.

- E. Lubricate, start up, and operate all equipment and demonstrate its operation and compliance with the specifications. Any undue noise, vibration and/or other objectionable features shall be promptly repaired and/or the device replaced and the system retested.
- F. All systems shall be placed in service and be operating properly for a period of not less than seven consecutive 24-hour days before acceptance.
- G. A written report of all test results shall be submitted to the Architect for approval.

3.09 CLEANING-UP

- A. At all times keep the building and premises in a neat manner. All instructions issued by the Architect and indicated elsewhere in these specifications in regard to storage of materials, protective measures, cleaning of debris etc., shall be followed. Upon completion of the work, thoroughly clean all machinery, piping, etc., and leave areas directly affected by work broom clean.

3.10 SYSTEM CLEANING AND START UP

- A. The piping systems shall first be flushed with city water before the air handling units are connected to the system. The air handling units shall then be connected and the system cleaned thoroughly with a solution of tri-sodium phosphate with circulating pumps in operation. The systems then shall be flushed, filled with fresh water and vented or purged of air. The system water should test slightly alkaline (above 7 and below 9 pH). Circulate the systems in a cold condition for several hours and re-vent at all high points. The heating system water shall then be heated to 200 degrees F. and again purged of air. The system water shall then be allowed to cool to operating temperature and a final check of the pH made. A final solution of boron nitrate (600 ppm chilled water, 900 ppm heating water) shall be added to the closed loop.
- B. Provide temporary connections and arrange piping in such a way to facilitate flushing and cleaning.
- C. The system flushing, cleaning, and testing shall be supervised by a water treatment company and three copies of a report of start up procedure, chemicals added, and a final pH submitted to the Architect.

3.11 RECORD DRAWINGS

- A. Maintain a clean, undamaged set of blueline or blackline contract drawings on site. Record all changes from contract drawings including "found" conditions, addenda, change orders, or other instructions issued by the Architect and submit to Architect as "record drawings" at close of project. Changes to contract documents shall be clouded and dated. Include dimensioned locations of underground piping from a clearly visible point on the building. Refer to Section 01 70 00.

3.12 CERTIFICATES

- A. Perform sterilization of the domestic water systems with a 50 ppm chlorine at each valved

outlet to be held for twenty-four hours with tests every eight hours or 200 ppm and allowed to stand for 3 hours. Then flush all outlets to 0.2 ppm. Testing shall be provided by locally based, full time, full service water treatment company with a minimum of three years experience in the water treatment business. Furnish all equipment and chemicals required. Provide appropriate tags on all outlets during testing to prevent accidental consumption or draining of the system. Give 24-hours notice to Owner's representative for start and finish inspections.

- B. Certify in writing, by the testing company, that the water lines have been sterilized and that approval of the installation was obtained from the authorities having jurisdiction over the work. Sterilization to be in accordance with requirements of local authorities. Give original to owner and include one copy with each O&M submittal.

3.13 OPERATION AND MAINTENANCE MANUAL

- A. Furnish to the Architect, three copies of operating and maintenance manuals – coordinate with Section 01 70 00. Manuals shall be loose-leaf 8-1/2"x11" format, bound in three-ring binders with identifying tabs separating sections. Each shall contain manufacturer's spare parts list, care, operation, and installation instructions. Provide a sequence of operation and a preventative maintenance schedule identifying daily, weekly, monthly and seasonal maintenance procedures as required. Contractor shall provide this sequence of operation and schedule if not given by the manufacturer. Provide a list of suggested suppliers with names, addresses, and phone numbers for each product or product group. Information may be printed on both sides of each page. Each binder shall include a cover sheet indicating the project title, architect, general contractor's name, and contractor's name, address, and phone.
- B. Instruct the maintenance personnel in the operation of the system and submit copies of a letter signed by the owner's representative attesting to such instructions listing names of Owner personnel who received these instructions. Include a copy with each operation and maintenance manual (O&M).
- C. Coordinate with "guarantees" and "certificates" for other inclusions.

3.14 GUARANTEES

- A. Guarantee work to be free from defects in workmanship and material for a period of **one** year from the date of final acceptance as determined by the Architect. Any material, equipment, or workmanship which proves defective within the guarantee period shall be promptly repaired or replaced at no cost to the Owner. Repair any damage done to areas, materials, and other systems resulting from the failure or defect at no cost to owner. Extend guarantee of replaced item a period of one year from date of replacement. Replace materials or equipment that requires excessive maintenance during the guarantee period. Service calls, repairs, adjustments, and replacements during the guarantee period shall be made at no cost to the owner.
- B. Provide notarized copies of the guarantee with the O&M manuals.
- C. Furnish a letter stating that the system has been installed in accordance with the contract documents and with any deviations detailed in full.
- D. Connections made to owner provided equipment shall be the responsibility of the contractor and shall be included in the guarantee.

- E. Service or replacement required as a result of faulty operation or neglect on the part of the Owner shall be paid for by the Owner at prevailing rates.
 - 1. However, if written instructions of the care and maintenance of equipment were not given to the Owner the neglect shall be on the Contractor's part and the cost of the service or replacements shall be at no cost to the owner.
- F. Standard factory warranties shall be provided on all equipment furnished and evidence of same shall be included in each O & M Manual.
 - 1. Provide an additional four-year warranty on all air conditioning compressors.
 - 2. Provide additional two-year warranty on automatic balancing hose kits.

END OF SECTION

SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING (TAB)

PART 1 - GENERAL:

1.01 GENERAL

- A. An independent testing, adjusting, and balancing (TAB) agency shall test, adjust, and balance the mechanical systems.
- B. The work included in this section consists of furnishing labor, instruments, and tools required in testing, adjusting and balancing the HVAC systems, as described in these specifications or shown on accompanying drawings. Services shall include checking equipment performance, taking the specified measurements, and recording and reporting the results.

1.02 WORK INCLUDED

- A. Air Systems
- B. Hydronic Systems
- C. Sound Testing
- D. Vibration Testing
- E. Special Systems

1.03 RELATED SECTIONS

- A. Section 23 05 00: Basic Mechanical Materials and Methods

1.04 DEFINITIONS, REFERENCES, STANDARDS

- A. All work shall be in accordance with the latest edition of the AABC National Standards. If these contract documents set forth more stringent requirements than the AABC National Standards, these contract documents shall prevail.

1.05 QUALIFICATIONS

- A. The TAB Agency shall be a current member of the Associated Air Balance Council (AABC).

1.06 SUBMITTALS (also refer to Section 23 05 00)

- A. The TAB agency shall submit a company resume listing personnel and project experience in air and hydronic system balancing and a copy of the agency's test and balance engineer (TBE) certificate.
- B. Procedures and Agenda: The TAB agency shall submit the TAB procedures and agenda proposed to be used.
- C. The TAB agency shall submit sample forms, which shall include the minimum data required by the AABC National Standards.

1.07 TAB PREPARATION AND COORDINATION

- A. TAB agency shall obtain shop drawings, submittal data, up-to-date revisions, change orders, and other data required for planning, preparation, and execution of the TAB work

no later than 30 days prior to the start of TAB work.

- B. System installation and equipment startup shall be complete prior to start of TAB agency's work.
- C. The building control system shall be complete and operational. The Building Control System contractor shall install all necessary computers and computer programs, and make these operational. Assistance shall be provided by TAB agency as required for reprogramming, coordination, and problem resolution.
- D. All test points, balancing devices, identification tags, etc. shall be accessible and clear of insulation and other obstructions that would impede TAB procedures.
- E. Qualified installation or startup personnel shall be readily available for the operation and adjustment of the systems. Assistance shall be provided as required for coordination and problem resolution.

1.08 REPORTS

- A. The TAB agency shall submit three copies of the final TAB report for review by the engineer. All outlets, devices, HVAC equipment, etc., shall be identified, along with a numbering system corresponding to report unit identification. The TAB agency shall submit an AABC "National Project Performance Guaranty" assuring that the project systems were tested, adjusted and balanced in accordance with the project specifications and AABC National Standards.

1.09 DEFICIENCIES

- A. Any deficiencies in the installation or performance of a system or component observed by the TAB agency shall be brought to the attention of the appropriate responsible person.
- B. The work necessary to correct items on the deficiency listing shall be performed and verified by the affected contractor before the TAB agency returns to retest. Unresolved deficiencies shall be noted in the final report.

PART 2 - PRODUCTS:

2.01 INSTRUMENTS

- A. All instruments used for measurements shall be accurate and calibrated. Calibration and maintenance of all instruments shall be in accordance with the requirements of AABC National Standards.

PART 3 - EXECUTION:

3.01 GENERAL

- A. The specified systems shall be reviewed and inspected for conformance to design documents. Testing, adjusting and balancing on each identified system shall be performed. The accuracy of measurements shall be in accordance with AABC National Standards. Adjustment tolerances shall be + 15% or - 5% unless otherwise stated.
- B. Equipment settings, including manual damper quadrant positions, manual valve indicators, fan speed control levers, and similar controls and devices shall be marked to show final settings.

- C. All information necessary to complete a proper TAB project and report shall be per AABC standards unless otherwise noted. The description for work required, as listed in this section, are a guide to the minimum information needed.
- D. Changes to pulleys, drives, etc. shall be part of the balance responsibility.

3.02 AIR SYSTEMS

- A. The TAB agency shall verify that all ductwork, dampers, grilles, registers, and diffusers have been installed per design and set in the full open position. Systems where VFD's or 2 speed motors are used, all balancing of air system will be conducted at the maximum and minimum rated speeds of unit. The TAB agency shall perform all TAB procedures in accordance with the AABC National Standards.
- B. Supply Fans:
 - 1. Fan speeds - Test and adjust fan RPM to achieve maximum or design CFM.
 - 2. Current and Voltage - Test and record motor voltage and amperage, and compare data with the nameplate limits to ensure fan motor is not in or above the service factor.
 - 3. Pitot-Tube Traverse - Perform a Pitot-tube traverse of main supply and return ducts, as applicable to obtain total CFM.
 - 4. Outside Air - Test and adjust the outside air on applicable equipment using a Pitot-tube traverse. If a traverse is not practical use the mixed-air temperature method if the inside and outside temperature differences is at least 20 degrees Fahrenheit or use the difference between Pitot-tube traverses of the supply and return air ducts.
 - 5. Static Pressure - Test and record system static profile of each supply fan. Variable frequency drive shall be tested in bypass mode to determine maximum static pressure capabilities.
- C. Exhaust Fans:
 - 1. Fan speeds - Test and adjust fan RPM to achieve maximum or design CFM.
 - 2. Current and Voltage - Test and record motor voltage and amperage, and compare data with the nameplate limits to ensure fan motor is not in or above the service factor.
 - 3. Pitot-Tube Traverse - Perform a Pitot-tube traverse of the main exhaust ducts to obtain total CFM.
 - 4. Static Pressure - Test and record system static profile of each exhaust fan.
- D. Zone, Branch and Main Ducts:
 - 1. Adjust ducts to within design CFM requirements. As applicable, at least one zone balancing damper shall be completely open. Multi-diffuser branch ducts shall have at least one outlet or inlet volume damper completely open.

E. Diffusers, Registers and Grilles:

1. Tolerances - Test, adjust, and balance each diffuser, grille, and register to within 10% of design requirements. Minimize drafts.
2. Identification - Identify the type, location, and size of each grille, diffuser, and register. This information shall be recorded on air outlet data sheets.
3. Adjust the louvers in all supply outlets to produce air distribution satisfactory to the occupants.
4. All measurements of air quantities delivered by grilles shall be made in a manner approved by the manufacturer of the grille.

F. Coils:

1. Air Temperature - Once air flows are set to acceptable limits, take wet bulb and dry bulb air temperatures on the entering and leaving side of each cooling coil. Dry-bulb temperature shall be taken on the entering and leaving side of each heating coil.

3.03 HYDRONIC SYSTEMS

A. The TAB agency shall, as applicable, confirm that all hydronic equipment, piping, and coils have been filled and purged; that strainers have been cleaned; and that all balancing valves (except bypass valves) are set full open. The TAB agency shall perform all testing and balancing functions in accordance with the AABC National Standards.

B. System Mains and Branches:

1. Adjust water flow in pipes to achieve maximum or design GPM.

H. Coils:

1. Tolerances - Test, adjust, and balance all chilled-water and hot-water coils within 10% of design requirements.
2. Verification - Verify the type, location, final pressure drop and GPM of each coil. This information shall be recorded on coil data sheets.

3.04 SOUND TESTING

A. The TAB agency shall conduct sound testing in the following areas per AABC National Standards and to the criteria listed, using sound meter with octave band analyzer:

<u>TEST AREA</u>	<u>NC LEVEL</u> <u>ACCEPTABLE</u>
Drum Room	25

3.05 SPECIAL SYSTEMS

A. Verification of HVAC Controls:

1. The TAB agency shall be assisted by the building control systems contractor in verifying the operation and calibration of all HVAC and temperature control

systems. The following tests shall be conducted:

- a. Verify that all control components are installed in accordance with project requirements and are functional, including all electrical interlocks, damper sequences, air and water resets, fire and freeze stats, and other safety devices.
- b. Verify that all controlling instruments are calibrated and set for design operating conditions.

B. Temperature Testing:

1. To verify system control and operation, a series of three temperature tests shall be taken at approximately two hour intervals in each separately controlled zone. The resulting temperatures shall not vary more than two degrees Fahrenheit from the thermostat or control setpoint during the tests. Outside temperature and humidity shall also be recorded during the testing periods.

C. TAB Report Verification:

1. At the time of final inspection, the TAB agency may be required to recheck, in the presence of the owner's representative, specific or random selections of data recorded in the certified report. Points and areas for recheck shall be selected by the owner's representative. Measurements and test procedures shall be the same as approved for the initial work for the certified report. Selections for recheck, specific plus random, will not exceed 10% of the total number tabulated in the report.

3.06 GUARANTEE

- A. All work shall be guaranteed for a period of ninety days. TAB contractor shall make adjustments during this period for comfort level adjustment, at direction of Engineer. TAB contractor shall meet with Engineer during this period as may be required to verify any readings. Coordinate with Section 01 30 00.

END OF SECTION

**SECTION 23 07 00
MECHANICAL INSULATION**

PART 1 – GENERAL:

1.01 WORK INCLUDED

- A. Piping insulation
- B. Equipment insulation and covering
- C. Ductwork Insulation
- D. Pre-Insulated Piping
- E. Duct Wrap for Grease Exhaust Ducts

1.02 RELATED SECTIONS

- A. Section 22 40 00 – Plumbing
- B. Section 23 05 00 – Basic Mechanical Materials and Methods
- C. Section 23 20 00 – Building Services Piping
- D. Section 23 30 00 – Air Distribution

1.03 QUALITY ASSURANCE

- A. The following is a list of additional manufacturers approved for use on this project:
 - 1. Insulation Products: Owens Corning, Johns Manville, CertainTeed, Schuller, Manson
 - 2. Closed Cell: Armstrong, Nomaco

1.04 SUBMITTALS

- A. Product Data: Provide product description, list of materials and thickness for each service or equipment scheduled, locations, and manufacturer's installation instructions.
- B. See Section 23 05 00 for general submittal requirements.

1.05 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

PART 2 – PRODUCTS:

2.01 GENERAL

- A. Coverings and linings, including adhesives when used, shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E 84.
- B. Duct coverings and linings shall not flame, glow, smolder, or smoke when tested in accordance with ASTM C 411 at the temperature to which they are exposed in service. The test temperature shall not fall below 250°F (121°C).

2.02 PIPE INSULATIONS

- A. Glass Fiber insulation shall meet ASTM C547. Insulation shall be rigid, molded, and

noncombustible.

1. 'K' ('ksi') Value: 0.23 at 75°F (0.033 at 24°C).
 2. Maximum Service Temperature: 850°F (454°C).
 3. Vapor Retarder Jacket: AP-T PLUS White kraft paper reinforced with glass fiber yarn and bonded to aluminum foil, secured with self sealing longitudinal laps and butt strips or AP Jacket with outward clinch expanding staples or vapor barrier mastic as needed.
- B. Elastomeric Foam (refrigeration, condensate) shall meet ASTM C534 and be flexible, cellular elastomeric, molded or sheet.
1. 'K' ('ksi') Value: 0.28 at 75°F (0.04 at 24°C).
 2. Maximum Service Temperature: 220°F (104°C).
 3. Maximum Flame Spread: 25
 4. Maximum Smoke Developed: 50 (3/4" thick and below). 100 (above 3/4" thick).
 5. Connection: Waterproof vapor retarder adhesive as needed.
 6. UV-Protection: Outdoor protective coating.
- C. Field Applied Jackets (for fiberglass insulation):
1. PVC Plastic: One piece molded type fitting covers and jacketing material, gloss white.
 - a. Connections: Tacks; Pressure sensitive color matching vinyl tape.
 2. Aluminum Jacket: 0.016 inch (0.045 mm) thick sheet, embossed finish, with longitudinal slip joints and 2 inch (50mm) laps, die shaped fitting covers with factory attached protective liner.

2.03 DUCTWORK INSULATION

- A. Flexible Glass Fiber Blanket: shall meet ASTM C 553 for flexible blanket.
1. 'K' ('ksi') Value: 0.29 Btu-in/(hr-ft²-°F) at 75°F for labeled thickness.
 - a. Labeled thickness of 2" shall have a minimum installed 'R' value of 5.6. (Installed 'R' value calculated with a material thickness of 1-1/2" following recommended duct wrap stretch-outs.)
 - b. Labeled thickness of 3" shall have a minimum installed 'R' value of 8.3. (Installed 'R' value calculated with a material thickness of 1-1/2" following recommended duct wrap stretch-outs.)
 2. Vapor Barrier Jacket: FSK, Aluminum foil reinforced with fiber glass yarn and laminated to fire-resistant kraft, secured with UL listed pressure sensitive tape and/or outward clinched expanded staples and vapor barrier mastic as needed.

- a. Permeance: 0.02 perms.
- 3. Density: 0.75 lb/cuft (Type 75)
- B. Canvas Jacket: UL listed fabric, 6 oz/sq yd (220 g/sq m), plain weave cotton treated with dilute fire retardant lagging adhesive.
- C. Duct Liner shall be: Flexible duct liner made from strong, flame attenuated glass fibers bonded with a thermosetting resin.
 - 1. 'K' ('ksi') Value: ASTM C 518, 0.24 at 75°F (0.036 at 24°C).
 - a. R-6.0 for 1-1/2" liner.
 - b. R-8.0 for 2" liner.
 - 2. Noise Reduction Coefficient based on Type "A" Mounting per ASTM C 423.
 - a. 0.80 NRC for 1-1/2" liner.
 - b. 0.85 NRC for 2" liner.
 - 3. Maximum Velocity on Mat or Coated Air Side: 6,000 ft/min (30.5 m/sec) per ASTM C 1071.
 - 4. Maximum operating temperature: 250°F (121°C) per ASTM C 411.
 - 5. Adhesive: UL listed waterproof type.
 - 6. Fasteners: Duct liner galvanized steel pins, welded or mechanically fastened.

PART 3 – EXECUTION:

3.01 EXAMINATION AND PREPARATION

- A. Verify that ductwork has been tested for leakage in accordance with SMACNA standards before applying insulation materials.
- B. Verify that all surfaces are clean, dry and free of foreign material.

3.02 INSTALLATION

- A. Install materials in accordance with manufacturer's recommendations, building codes and industry standards.
- B. Continue insulation vapor barrier through penetrations except where prohibited by code.
- C. Piping Insulation
 - 1. Locate insulation and cover seams in least visible locations.
 - 2. Neatly finish insulation at supports, protrusions, and interruptions.
 - 3. Provide form fitted insulation for elbows and tees with PVC covers.

4. Provide fitted insulation which can be removed and reused around equipment, valves and flanges, etc.
5. Provide insulated cold pipes conveying fluids below ambient temperature with vapor retardant jackets with self sealing laps. Insulate complete system.
6. For insulated pipes conveying fluids above ambient temperature, secure jackets with self-sealing laps or outward clinched, expanded staples. Bevel and seal ends of insulation at equipment, flanges, and unions.
7. Provide insert between support shield and piping on piping 1-1/2" inches (38 mm) diameter or larger. Fabricate of heavy density insulating material suitable for temperature. Insulation inserts shall not be less than the following lengths:

1-1/2" to 2-1/2" pipe size	10" long
3" to 6" pipe size	12" long
8" to 10" pipe size	16" long
12" and over	22" long

8. For pipe exposed in mechanical equipment rooms or in finished spaces below 10 feet (3 meters) above finished floor, finish with PVC jacket and fitting covers.
9. For exterior applications, provide weather protection jacket. Insulated pipe, fittings, joints, and valves shall be covered with aluminum jacket. Jacket seams shall be located on bottom side of horizontal piping.

E. External Ductwork Insulation:

1. Provide insulated ductwork with vapor retardant jacket. Seal all vapor retardant jacket seams and penetrations with UL listed tapes or vapor retardant adhesive.
2. Continue insulation through walls, sleeves, hangers, and other duct penetrations except where prohibited by code.
3. The underside of duct work 24" or greater shall be secured with mechanical fasteners and speed clips spaced approximately 18" on center. The protruding ends of the fasteners should be cut off flush after the speed clips are installed, and then, sealed with the same tape as specified above.
4. For ductwork exposed to physical abuse in mechanical equipment rooms or in finished spaces, finish with PVC jacket or aluminum jacket.
5. For exterior applications, provide insulation with a weather protection jacket.

F. Duct Liner:

1. Adhere insulation to sheet metal with full coverage of a UL listed adhesive.
2. Secure insulation with mechanical liner fasteners as indicated by SMACNA or manufacturer. Pin length should be as recommended by the liner manufacturer.
3. All exposed edges of the liner must be factory or field coated. For systems operating at 4000 fpm or higher a metal nosing must be installed in all liner leading edges.

4. Repair liner surface penetrations with UL listed adhesive.

3.03 PIPING INSULATION SCHEDULE

	Pipe Size	Insulation Thickness
A. Fiber Glass Insulation		
Domestic Hot Water	Up to 4"	1"
Chilled Water Supply & Return	Up to 1-1/2"	1"
Heating Water Supply & Return	Up to 1-1/2"	1"
Piping Subject to freezing	All Sizes	1"
B. Elastomeric Foam		
Refrigerant Suction	All Sizes	3/4"
Refrigerant Hot Gas	All Sizes	3/4"
Condensate	All Sizes	1/2"

- C. Domestic hot water branch lines down in walls up to 3/4" may be insulated with 1" elastomeric foam.

3.04 DUCTWORK INSULATION SCHEDULE

	Thickness	Finish
A. Flexible Fiber Glass (wrap)		
Interior Round Low Pressure Supply and Return	2"	FSK
B. Duct Liner		
Interior Rectangular Supply and Return	1-1/2"	Mat Faced

END OF SECTION

SECTION 23 09 00
ENERGY MONITORING AND CONTROL SYSTEM (EMCS)

PART 1 - GENERAL:

1.01 WORK INCLUDED

- A. EMCS
- B. Control Valves
- C. Valve Actuator Electric/Electronic
- D. Control Dampers

1.02 RELATED SECTIONS

- A. Section 23 05 00 - Basic Mechanical Materials and Methods
- B. Section 23 20 00 - Building Services Piping
- C. Section 23 30 00 - Air Distribution
- D. Section 23 05 93 - Testing, Adjusting, and Balancing (TAB)

1.03 SUBMITTALS (Also Refer to Section 23 05 00)

- A. Prior to commencement of work, provide complete system drawings, control air compressor calculation, panel drawings, schematic diagrams, point to point wiring diagrams, written operational sequences, and description and engineering data on each control system component.

1.04 ENVIRONMENT

- A. The EMCS shall be capable of operating in an environment of 32-120 degrees F and 10-95% relative humidity. Sensors and control elements shall operate under the temperature, pressure, humidity, and vibration conditions normally encountered in the installed location. EMCS system shall maintain accuracy as follows:
 - 1. +/- .5°F for the space temperatures in the 40 - 120°F range.
 - 2. +/- 1.0°F for outside air temperatures in the 30 - 130°F range.
 - 3. +/- 1.0°F for water temperature in the 30 - 230°F range.
 - 4. +/- .5°F for duct temperatures in the 40 - 130°F range.
 - 5. +/- 3% for relative humidity in the 20 - 70% range.

PART 2 - PRODUCTS:

2.01 EMCS

- A. General
 - 1. The Electronic Microprocessor Based Energy Monitoring & Control System (EMCS) shall be an extension of the existing Carrier Control Network and shall monitor the Data Environment and perform control functions in relation to a programmed strategy and the status of the Data Environment.
 - 2. The system shall use solid state computer-based digital and analog technology. The system shall be standard with the manufacturer to insure ongoing parts availability and trained technical support.
 - 3. The EMCS shall be of the fully user programmable type requiring no special

computer education for operation. All necessary instruction manuals and user orientation training shall be supplied by the manufacturer or agent thereof.

4. Communication protocol between Application Specific and Programmable controllers shall adhere to the Carrier Control Network Communication Protocol.
 5. The intent of this division specification is to establish a level of control system required for this project. All functions described herein are required but it is understood that some degree of flexibility may be required. Any major deviation requires the written approval of the Architect/Engineer prior to bid date.
- B. Acceptable Manufacturers:
1. Carrier
- C. Modular Design/Expandability
1. The EMCS shall be of a modular design providing distributed processing capability, and allowing future expansion of both input/output points and processing/control functions.
- D. Battery Backup
1. The system shall be tolerant of power failure and hold memory a minimum of 24 hours using battery backup. On power restoration, the system shall automatically execute the following restart procedures.
 - a. Come on line
 - b. Update all monitored functions.
 - c. Resume operation based on current time and status.
 - d. Implement special building start up strategies as required.
 - e. Log time of power outages and start ups.
 2. The system shall monitor the battery backup and provide a low battery alarm.
- E. Program Storage
1. The system shall be capable of interfacing with a mass storage (DVD and CD) device, for use in up loading and down loading programs to the EMCS.
- F. EMCS Inputs
1. The input section of the EMCS shall connect the EMCS to the building environment. The EMCS shall be capable of accepting information in the form of 3k and 10k thermistors, 0-5 VDC, 0-10 VDC, 4-20 mA, dry contacts, and pulse inputs.
 2. The Analog Input (AI) function shall monitor each analog input, perform analog-to-digital (A/D) conversion, and hold the digital value in a buffer for interrogation. The A/D conversion shall have a minimum resolution of 10 bits. Analog inputs shall withstand continuous direct shorting to 120 VAC, 60 Hz power without failure.
 3. The Digital Input (DI) function shall accept dry contact closures and voltage level

transitions. Digital inputs shall withstand continuous direct shorting to 120 VAC, 60 Hz power without failure.

4. Temperature inputs originating from a thermistor or resistance temperature detector (RTD) shall be monitored and buffered as an AI, except that automatic conversion to degrees F shall occur without any additional signal conditioning. Temperature inputs shall withstand continuous direct shorting to 120 VAC, 60 Hz, power without failure.
5. The pulse or watt accumulator function shall have the same characteristics as the DI, except that, in addition, a buffer shall be included to totalize pulses between interrogations. The pulse accumulator shall accept rates up to 10 pulses/second. Pulse inputs shall withstand continuous direct shorting to 120 VAC, 60 Hz, power without failure.

G. EMCS Outputs

1. The Digital Output (DO) function shall provide contact closure for momentary (Pulse Width Modulation) and maintained operation of field devices. Output pulse width shall have a minimum resolution of 0.1 seconds. Isolation and protection against voltage surges up to 180 VAC peak shall be provided. Contact rating shall be a minimum of 2 amps at 24 VAC. Each digital output shall be equipped with an On/Off/Auto switch to manually obtain either output state. Manual overrides shall be reported to the Master at each update. An LED shall be provided to indicate the state of each digital output.
2. The EMCS shall have an Analog Output (AO) function which shall accept digital data, perform digital-to-analog (D/A) conversion, and modify the signal of a current loop within the range of 4-20mA. D/A conversion shall have a minimum resolution of 8 bits. 4-20mA signal shall be regulated with a minimum resolution of .16mA.

H. Surge Protection

1. Lighting arrestors shall be provided on communication lines that run between buildings.
2. Controllers shall be rated to withstand voltage spikes of 1500 volts.
3. Input wiring shall be shielded; output wiring and power circuits shall use metal oxide varistors.
4. Noise, surge, and spike protection shall be Kele Model No. HSP-121-B or equivalent.

2.02 CONTROL VALVES (Also Refer to Section 23 20 00)

A. General:

1. Control valves shall be 2 or 3-way type for two-position or modulating service as scheduled, shown on drawings, or as specified in Sequence of Operation.

B. Close-off (differential) pressure rating:

1. Valve actuator and trim shall be furnished to provide the following minimum close-

off pressure ratings:

a) Water Valves:

- 1) 2-way - 150% of total system (pump) head.
- 2) 3-way - 300% of pressure differential between ports A and B at design flow or 100% of total system (pump) head.

2.03 VALVE ACTUATORS - ELECTRIC/ELECTRONIC

A. Valve actuators shall be compatible with the input signal provided. They must also have sufficient torque to provide the characteristics required for the valve body to meet the requirements specified for the intended service. Valve actuators shall be Delta, Johnson Controls, Inc., Belimo, ABZ.

1. Actuator shall be fully modulating, two position or spring return as required for each application.
2. Actuator shall fail - open - closed - or last position as required for each application.
3. Enclosure and components shall meet all fire rating and smoke generation requirements for location of valve including plenum applications.
4. Enclosure shall be NEMA-3 rated when used for exterior applications.

2.04 CONTROL DAMPERS

A. The dampers for the outside air shall be furnished by the air handling unit supplier. The damper motor and linkage shall be furnished and installed by Division 15900. The damper motor shall have a 120/24V transformer.

PART 3 - EXECUTION:

3.01 QUALIFICATIONS

A. Control contractor shall be an authorized distributor for Carrier Controls Network. Local office shall have an inventory of spare parts for support of all systems provided under this contract.

3.02 INSTALLATION

- A. Check and verify location of all equipment with plans before installation.
- B. Interlock EMCS alarms with starter switching to bypass alarm when equipment is manually disconnected to avoid false alarms.
- C. Provide engineering, installation, supervision, labor, calibrations, software programming, and commissioning necessary for a complete and fully operational system.

3.03 STARTUP AND CHECKOUT

A. Provide startup of system and program user supplied operating hours and holiday scheduling.

- B. A system demonstration procedure shall be developed, submitted to Architect for approval, and performed in presence of Architect's representative for final checkout of system. Minor program modifications requested by the owner at that time shall be made at no charge to the owner.

3.04 SPARE PARTS

- A. Field Controllers:
 - 1. Provide one spare controller (complete) for each type of controller used in the system.
- B. Field Hardware:
 - 1. Provide one spare of each sensor, transducer, relays, and actuator used in the system.
- C. Additional Spare Parts:
 - 1. Provide, as part of your submittals, a complete list of recommended spare parts including current list pricing and discount level from list price.

3.05 WIRING

- A. All 24 volt and lower control wiring including conductors, control relays, switches, sensors, transformer interconnections, etc., for control functions shall be provided as part of Section 23 09 00 work.
- B. Control wiring for start/stop signals to motor starters and contactors shall be provided as part of Section 23 09 00 work.
- C. Electrically operated PE and EP switches, furnished under this section, shall be wired by Division 15900 unless specifically indicated otherwise. Control wiring shall be run to terminal strips in panels located adjacent to equipment except where EP and PE switches are installed directly in starter control circuits. Extension of power wiring from terminal strips and starters will be provided and installed under Section 16.
- D. Control switches and cover plates as applicable shall utilize same color and material as specified in Division 26 for electrical wiring devices.
- E. EMCS bus wiring must be wired using shielded cable approved for return air plenums. Use 22-gauge for runs up to 250 ft. For runs from 250 ft. to 500 ft. use 18-gauge.
- F. EMCS bus wiring must not be run in the same conduit as line voltage wiring (30 VAC or above) or wiring that switches power to highly inductive loads (contactors, coils, motors, generators, etc.)

3.06 OPERATOR INSTRUCTIONS

- A. Provide competent instructors who will give full instruction to designated personnel in the adjustment, operation, and maintenance of the equipment and system specified, including pertinent safety requirements. A minimum of sixteen (4) hours of instruction, in two two-hour sessions spaced a minimum of one week apart, shall be provided.
- B. A written statement that training has been completed, signed by owner's designated

personnel, shall be submitted with warranty to Architect.

3.07 WARRANTY AND INSPECTIONS

- A. Section 23 09 00 shall guarantee work to be free from defects in workmanship and material for a period of one year from the date of final acceptance. Any material or equipment furnished that proves defective within the period shall be promptly repaired or replaced without cost to the owner.
- B. Make minimum of three complete inspections of approximately one hours duration, in addition to normal service calls to adjust controls, with reports written and submitted to the Architect/Engineer during first year. Inspections shall be spaced three months apart.

END OF SECTION

**SECTION 23 20 00
BUILDING SERVICES PIPING**

PART 1 - GENERAL:

1.01 GENERAL

- A. This section covers basic materials and methods which may be common to one or more subsequent sections.

1.02 WORK INCLUDED

- A. Valves
- B. Storm Drainage Piping
- C. Sanitary Waste and Vent Piping
- D. Domestic Water Piping
- E. Heating and Cooling Piping
- F. Piping Joints
- G. Hangers and Supports
- H. General Piping Specialties
- I. Heating and Cooling Piping Specialties
- J. Automatic Flow Control Valves
- K. Chemical Water Treatment

1.03 RELATED SECTIONS

- A. Section 33 00 00 for Site Water Storm Drainage, and Sanitary Sewerage Distribution
- B. Section 23 05 00 for Basic Mechanical Materials and Methods
- C. Section 23 07 00 for Mechanical Insulation
- D. Section 23 09 00 for Automatic Valve Operators

1.04 SUBMITTALS (Also refer to 23 05 00)

- A. Prior to commencement of work, provide submittals on the following:
 - 1. Valves
 - 2. Piping Specialties (Heating and Cooling and General)
 - 3. Automatic Flow Control Valves
 - 4. Chemical Water Treatment
 - 5. Pipe Hangers

PART 2 – PRODUCTS:

2.01 GENERAL

- A. Piping and piping specialties exposed within air plenums shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E 84.

2.02 VALVES

- A. Provide isolation valves and either unions or flanges to isolate and to allow removal of all mechanical equipment.
- B. All isolation valves (SOVs) 2" and smaller shall be 1/4 turn ball valves. SOVs 2-1/2" and

larger shall be butterfly valves.

- C. Valves shall be of an approved make, equivalent to Stockham company numbers listed as follows:

1. Bronze Ball Valves - 2" and under
600 psi CWP, 150 psi SWP, two piece construction, full port, blowout proof stem, ¼ turn, PTFE packing and seats, adjustable packing nut, bronze ball, threaded ends: Stockham S206BR-R-T, solder ends with extended solder cops: Stockham S206BR-R-S.

- D. Valves in Insulated Piping: Valves shall have 2-inch stem extensions and the following features:

1. Ball Valves: Shall have extended operating handle of non-thermal-conductive material, protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation, and memory stops that are fully adjustable after insulation is applied.

- E. All valves shall be of the same manufacturer equivalent of Stockham, Red and White, Nibco, Hammond, Henry, and SSI Equipment.

2.03 STORM DRAINAGE PIPING

- A. The building's storm drainage piping above and below grade to a point five feet outside the building shall be Schedule 40 PVC DWV or ABS DWV plastic pipe.

2.04 SANITARY WASTE AND VENT PIPING

- A. The building's vent and sanitary waste piping to a point five feet outside the building shall be Schedule 40 PVC DWV or ABS DWV plastic pipe.
- B. Vent pipes shall be Schedule 40 PVC DWV or ABS DWV plastic pipe.

2.05 DOMESTIC WATER PIPING

- A. Above ground domestic water piping shall be Type L seamless hard drawn copper tubing with cast brass or wrought copper fittings for piping up to 2" and wrought copper fittings for 2-1/2" and larger.
- B. Underground domestic water piping shall be Type K copper, soft annealed, without joints when possible.

2.06 HEATING AND COOLING PIPING

- A. Condensate Drain Piping
1. Air conditioning condensate piping shall be type "M" copper with plugged tees for cleanouts. Male threads on plugs shall be wrapped with Teflon[®] tape prior to threading into tees.
- B. Hydronic Piping:
1. Chilled, heating, and condenser water piping shall be Type "L" hard drawn copper with wrought copper fittings.

2. Chilled, heating and condenser water piping 2 ½" and larger may be Schedule 40 black steel with forged carbon steel fittings.

C. Refrigerant Piping

1. Air conditioning refrigerant piping shall be ACR refrigeration hard tempered tubing cleaned and capped with wrought copper fittings.
2. Refrigeration piping shall have a triple evacuation with dry nitrogen and a 12 hour holding tests inspected by Architect's representative. A written report of test results shall be submitted for approval signed by inspecting party.

2.07 PIPING JOINTS

A. Plastic Pipe:

1. Joints in plastic pipe shall be made using solvent cement per manufacturer's recommendations.
 - a. Solvent cement for PVC welding shall have maximum volatile organic compound (VOC) emissions of 510 g/L less water.
 - b. Solvent cement for CPVC welding shall have maximum volatile organic compound (VOC) concentration emissions of 490 g/L less water.
 - c. Solvent cement for ABS welding shall have maximum volatile organic compound (VOC) emissions of 325 g/L less water.

B. Copper Water Piping:

1. Joints in copper water piping 2" and smaller above grade shall be soldered with ENGELHARD "SILVABRITE 100", 100% LEAD FREE or other non-lead solder, minimum 4,000 psi tensile strength using nokorode solder paste applied with a brush to both the pipe and the inside of the fitting socket. No acid core solder nor flux containing acid shall be used. Pipe shall be cut square and reamed. The parts of the pipe and fittings to be soldered shall be thoroughly cleaned with sand cloth before applying flux.
2. Joints in copper piping 2 ½" and larger and all sizes below grade shall be brazed using a brazing compound with a minimum of 15% silver.

C. Hydronic Piping:

1. Joints in copper hydronic piping 2" and smaller above grade shall be soldered with lead free 95-5 solder.
2. Joints in copper hydronic piping 2 ½" and larger and all sizes below grade shall be brazed using a brazing compound with a minimum of 15% silver.
3. Joints in steel piping shall be welded. Joints in chilled, heating and condenser water piping above grade may be made with Victaulic couplings at contractor's option.

D. Refrigerant Piping:

1. Joints in copper air conditioning refrigerant piping shall be made with silfos and flux as recommended by the brazing alloy manufacturer. During brazing the pipe and fittings shall be kept full of an inert gas, dry nitrogen, or CO₂, to prevent formation of scale.

2.08 HANGERS AND SUPPORTS

A. Pipe Hangers:

1. Approved manufacturers: Elcen, Unistrut, B-Line.
2. All piping within the confines of the building shall be supported by means of adjustable steel clevis hangers spaced per ASHRAE recommendations and suspended from the building construction by all thread rods sized per ASHRAE. Strap, wire, or chair hangers are not permitted. Where suspended from steel structural members, appropriate clamps shall be used. Provide a sheet metal saddle, minimum 12" long by two times the diameter of the outside of the insulated pipe at all hangers for insulated pipe.
3. Trapeze hangers may be used in lieu of individual clevis hangers at contractor's option. Where trapeze length exceeds 42", an additional hanger rod shall be installed at mid-span. Trapeze hangers shall be spaced no further apart than the smallest pipe on the trapeze requires. Provide hold down clamps for each insulated pipe and a sheet metal cover full diameter of pipe insulation at each hold down clamp.
4. Where piping is supported from concrete or masonry construction, approved concrete inserts shall be used. Anchors shall be equivalent to HILTI "HDI" drop-in anchors or HILTI "HVA" adhesive anchors as required to accommodate applicable loads. Coordinate selection with structural. Power driven anchors/studs shall not be used.
5. Clevis hangers shall be sized large enough to pass insulation on insulated pipe. Provide sheet metal saddle for piping 1" and larger. Refer to 23 07 00 for inserts on larger piping.
6. Pipe Rollers: All pipe rollers shall be of single piece cast iron construction. Reference, Elcen #17. Provide chain; carrier; clevice as required per each roller application. Individual rollers on each side of pipe are not acceptable.
7. All sizes of non-insulated copper piping shall be supported using "Trisolator #500" isolators at all support locations.
8. Insulated piping up to 1-1/2" shall continue insulation through support clamp or hanger.
9. Plastic piping shall be supported a minimum of 4' on center or as required to avoid sagging.
10. Except where governed by local codes, maximum hanger spacing for metal piping and minimum hanger rod sizes shall conform to the following table:

	<u>Pipe Size</u>	<u>Spacing</u>	<u>Hanger Rod</u>
Steel Pipe	1/2"	6-0"	3/8"

	3/4"-1-1/4"	8'-0"	3/8"
	1-1/2, 2"	10'-0"	3/8"
	2-1/2"	10'-0"	1/2"
	3"	12'-0"	1/2"
	4"	12'-0"	5/8"
	5"	12'-0"	5/8"
	6"	12'-0"	3/4"
	8-12"	12'-0"	7/8"
Copper Pipe	1/2"	6'-0"	3/8"
	3/4", 1"	8'-0"	3/8"
	1-1/4"-2"	10'-0"	3/8"
	2-1/2"-5"	12'-0"	1/2"
	6" and above	12'-0"	3/4"
Cast Iron	2"	1 ea. Joint	3/8"
	3"	1 ea. Joint	1/2"
	4" & 5"	1 ea. Joint	5/8"
	6"	1 ea. Joint	3/4"

B. Piping Supports:

1. Approved Manufacturers: Clearline Technologies "C-Port" (Contact Southwest Sales Reps Arizona at 480-966-0049 (Scott Van Horne)).
2. Construction shall be UV resistant, 100% recycled rubber. Minimum base shall be 6" x 10" x 4". [Model CR-Series (roller)/Model C-Series (strut)]

2.09 GENERAL PIPING SPECIALTIES

A. Unions:

1. Unions in screwed steel pipe 2" and smaller and all unions in gas pipe shall be ground joint malleable iron with brass to iron seats.
2. Unions in welded pipe shall be a slip-on weld flange.
3. Unions in copper pipe 2" and smaller shall be ground joint copper unions equivalent to Mueller C-107. Unions for 2-1/2" and larger pipe shall be bronze flanges.
4. Provide nuts, bolts, and gaskets for flanges. Materials shall be compatible with the piping and fluid conveyed.

B. Sleeves:

1. Pipe sleeves shall be schedule 40 steel pipe for all pipes passing through fire rated floors or walls. Sleeves for non-rated walls shall be PVC schedule 40 pipe or 18-gauge sheet metal. Sleeves for uncovered pipe shall be two pipe sizes larger than the main. Sleeves for insulated mains shall be of sufficient size to pass the covering with a minimum 1/4" clearance.

2.10 HEATING AND COOLING PIPING SPECIALTIES

A. Flexible Stainless Steel Hoses:

1. Approved Manufacturers: Mason, C-Flex, Metraflex, Twin City Hose, or approved

equivalent.

2. Flexible stainless steel hoses shall be manufactured using type 304 stainless steel hose and braid. Sizes 2-1/2" and larger shall have one fixed and one floating raised face carbon steel plate flange. Sizes 2" and smaller shall have threaded male nipples or copper ends as required.
3. Minimum lengths and minimum number of corrugations per foot to assure flexibility are as tabulated:

Pipe Size	Flanged Face to Face	Copper or Threaded Ends End to End	Minimum Corrugations per Foot
1/2"	-	12"	108
3/4"	-	12"	94
1"	-	12"	84
1-1/4"	-	12"	74
1-1/2"	-	12"	70
2"	-	12"	68
2-1/2"	12"	-	56
3"	12"	-	54
4"	18"	-	32
5"	18"	-	30
6"	18"	-	29
8"	18"	-	26
10"	24"	-	25
12"	24"	-	24
14"	30"	-	14
16"	36"	-	14

4. Hoses shall be installed on the equipment side of the shut off valves horizontal and parallel to the equipment shafts wherever possible.
5. Submittals shall include type of stainless steel and fittings, lengths, and number of corrugations per foot, as well as temperature and pressure ratings.

B. Strainers:

1. Approved Manufacturers: Armstrong, Yarway, Watts, SSI Equipment
2. Chilled and heating water strainers to be full size, bronze body "Y" pattern, 1/8" perforation mesh monel metal screens. 2" and smaller shall be screwed, 2-1/2" and larger shall be flanged. Strainers to have 3/8" drain valve and cap.
3. Chilled and heating water strainers 2-1/2" and larger to be full size, cast iron body "Y" pattern, 1/8" perforation stainless steel mesh metal screens for strainers 2-1/2" to 8" in size. 3/16" perforations on strainers 10" to 12" in size. Strainers to have 3/8" drain valve and cap. Strainers 2-1/2" and larger shall be flanged. Armstrong, Yarway, Watts, or equivalent.

C. Stick-Type Thermometers:

1. Approved manufacturers: Powers, Weiss, Weksler, Terice, Miljoco, Winters Instruments

2. Thermometer to have Red reading mercury, adjustable angle with 9" scale constructed of GE Valox 735 polyester or cast aluminum and heavy glass lens securely mounted to prevent rattling. Scale shall be white coated aluminum with permanently baked bold black markings locked in place and adjusted through a device at top of scale. There shall be no mounting screws to cover up the scale markings. Accuracy shall be 1% of scale range. Provide range of 0-120 degrees for chilled water and range of 30-240 degrees for heating hot water applications.
3. Thermometer shall be supplied with a brass well of 3-1/2" in length for systems up to 6" in pipe diameter. 6" stem lengths shall be provided for larger diameter pipe applications. Wells to be of the extended neck type when used on applications requiring more than 1" insulation.
4. Locate all thermometers as close as possible to equipment being monitored. Thermometer shall be mounted no higher than 7' from floor and shall be easily accessible by the operator.

D. Pressure Gauges:

1. Approved manufacturers: Powers, Weiss, Weksler, Trerice, Miljoco, Winters Instruments
2. Pressure gauge shall have 4-1/2" diameter dial, stainless steel case with 1/4" NPT lower connection, copper alloy bourdon tube, brass socket with silver soldered connection and 1% mid-range accuracy with recalibrating pointer. Provide with snubber and gauge cock. When used on a steam line, supply with a steel syphon tube. Provide scales suitable for specific systems, including compound gauges, so gauge will read within the middle 1/3 of the overall scale. Note: Cooling tower pump requires compound gauge.

E. P-T Plugs:

1. Approved Manufacturers: Cflex, Sisco, Watts.
2. Test plug of solid brass into appropriately sized welded socket, threaded boss, valve or vessel. Plugs shall be located per project drawings. Test plug shall have a dual seal core or Nordel, good up to 350°F for water, (or neoprene to 200°F for natural gas) and shall be rated zero leakage for vacuum to 1000 psig. Plug shall be capable of receiving a pressure or temperature probe.
3. For insulated pipe, provide extended test plugs.
4. Owner shall be provided with one master test kit. Kit shall contain one or two 2-1/2" or 3-1/2" pressure gauges of suitable range, one or two gauge adapter(s) 1/8" o.d. probe(s) and two 5" stem pocket testing thermometers consisting of one 0-220°F, and one 50-550°F in a sturdy custom carrying case.

2.11 AUTOMATIC FLOW CONTROL VALVE PIPING PACKAGES

- A. The contractor shall furnish and install automatic pressure compensating flow control valves where indicated on the drawings. Valves shall have the capacities and pressure differential characteristics as indicated.
- B. Supply side valve body shall be forged brass with a 20 mesh stainless steel strainer. The body design shall allow inspection or removal of strainer without disturbing piping

connections. Body shall have an integral handle ball valve and one union end with interchangeable end pieces for the outlet of the body. Provide pressure/temperature test port and drain valve with hose bib adapter and cap.

- C. Return side valve body shall be forged brass with a flow control cartridge assembly. The body design shall allow inspection or removal of cartridge without disturbing piping connections. Body shall have an integral handle ball valve and one union end with interchangeable end pieces for the inlet of the valve body. Provide two pressure/temperature test ports.
- D. Flow control valves shall be factory set and shall automatically limit the rate of flow to required engineered capacity within plus or minus 5% accuracy over an operating pressure differential of at least 14 times the minimum required for control.
- E. The control mechanism of the flow control valve shall consist of a self-contained, open-chamber cartridge assembly with unobstructed flow passages that eliminate accumulation of particles and debris.
- F. The cartridge assembly of the flow control valve shall consist of a spring-loaded cup. The cup shall be guided at two points and shall utilize the full available differential pressure across the valve to actuate the cup and thereby reduce friction and hysteresis and eliminate binding. It shall have a thin orifice plate for self cleaning of the variable inlet ports over the full control range. Cartridge must be removable in one piece.
- G. Provide a metal identification tag, with chain, for each installed valve. The tag to be marked with valve model number and rated flow in GPM.
- H. Flow control valve shall be warranted for period of five years from date of original sale.
- I. Approved manufacturers: Griswold, Flow Design, Delta, Hays Fluid Control.

2.12 CHEMICAL WATER TREATMENT

- A. Systems and chemicals shall be provided by Tucson based full time, full service water treatment company with a minimum of three years experience in the water treatment business. The water treatment system shall be designed to control total dissolved solids, corrosion, scale, algae and fungus. This includes automatic feed and bleed control equipment, chemical treatment, and a service program as applicable. Control system shall have a built in flow switch or be interlocked with condenser water pump to shut down system in case of no water flow. This package shall be provided complete by a single water treatment firm for individual responsibility.
- B. The water treatment company shall provide:
 - a. Initial water analysis and recommendations.
 - b. System start-up assistance.
 - c. Initial water treatment of closed loop and cooling tower water.
 - d. One year supply of chemicals.
 - e. One year service program with minimum monthly inspections of all equipment.
 - f. Logs and written test instructions to be provided.
- C. Water treatment company to provide water test kit to owner and give a minimum of four hours instruction in the use of the water test kit and instructions of required preventive maintenance. Verification of this instruction signed by owner's representative to be submitted with final operating and maintenance manuals. Test kit to include inhibitor kit

and TDS meter.

PART 3 - EXECUTION:

3.01 VALVES

- A. Valves shall be installed with valve stem in upright (vertical) orientation.
- B. Provide access panels for any valves located above solid ceilings at valve location.
- C. Provide a shut-off valve or angle stop with cast brass stem and nuts to isolate all plumbing equipment.
- D. All flexible piping connectors (expansion joints) shall be installed on the equipment side of the shut off valves.

3.02 PLASTIC PIPE

- A. Joints in plastic pipe shall be made with solvent and cement per manufacturer's recommendations.
- B. Plastic piping exposed to sunlight shall be painted with two coats of latex paint. Color shall be white unless otherwise specified by Architect.

3.03 COPPER PIPING JOINTS

- A. No acid core solder or flux containing acid shall be used.
- B. Pipe shall be cut square and reamed.
- C. The parts of the pipe and fittings to be soldered shall be thoroughly cleaned with sand cloth before applying flux.
- D. Maintain a minimum of 50% penetration of brazed joints.

3.04 THREADED PIPE

- A. Joints in threaded pipe shall be made with sharp clean threads with Teflon joint compound on the male threads only. Joint compound shall be listed and approved and compatible with pipe materials and fluid being conveyed. All pipe shall be reamed to full inside diameter. Only pipe reamers shall be used to ream pipes.

3.05 HANGERS AND SUPPORTS

- A. Support piping to adequately prevent sagging, pocketing, swaying, and displacement.
- B. Vertical piping shall be secured to structure.
- C. Piping shall not be racked to the floor in kitchen or areas other than mechanical rooms.

3.06 ESCUTCHEONS

- A. All pipes passing through walls, floors, or ceiling in finished rooms shall be fitted with polished chrome plated escutcheons.

3.07 UNIONS

- A. A dielectric union shall be used to join any dissimilar metals.
- B. Unions shall be installed in piping on the equipment side of each service valve and in all connections to fixtures or equipment where the trimmings do not permit convenient removal.
- C. Provide dielectric unions at all tank (including hot water storage tanks) connections.

3.08 SLEEVES

- A. Where pipes pass through floors (except slab on grade) or interior masonry or concrete walls, pipe sleeves shall be installed. Sleeves through concrete walls or floors shall be installed with minimum 1" clearance to be packed and sealed. Sleeves through floors shall extend a minimum of two inches above the finished floor. Sleeves through walls shall be one continuous piece and shall extend from finished surface to finished surface.
- B. The outer surface of the sleeve shall be fixed to the partition it penetrates with pour rock, mortar, or etc. for fire-resistance-rated assemblies, the internal surface shall be sealed with a UL 2079 approved firestopping material. Sealant shall be tested per ASTM E 1399. Equivalent to Bio Fireshield Biostop 500+.
 - 1. Firestopping material shall have maximum volatile organic compound (VOC) emissions of 50 g/L less water.
- C. Sleeve shall not support pipes as it will transmit vibration and sound to structure.
- D. Copper pipe passing through a steel sleeve shall be protected with polyethylene tape or other approved dielectric materials.

3.09 INSTALLATION

- A. No service lines shall be laid on the backfill over other service lines or conduits except at crossings. All piping shall be accurately cut and installed in place without forcing. Changes in direction shall be made with fittings. Bending of pipe is not permitted. Reducing fittings shall be used where pipe sizes change, rather than bushings.
- B. Pipe and fittings located within return air plenums shall have a flame spread index of not more than 25 and a smoke developed rating of not more than 50 when tested in accordance with the test for Surface Burning Characteristics of Building Materials, U.B.C. Standard Number 42.1.
- C. Route piping to allow sufficient access to all equipment, valves, controls, etc., for maintenance.
- D. In general, piping shall be installed below electrical conduits not requiring maintenance access.
- E. All pipe and fittings exposed in finished areas shall be chrome plated unless otherwise approved in writing.
- F. It shall be this contractor's responsibility to coordinate inverts of underground waste lines and rainwater leaders with sanitary and storm sewer lines and other site utilities.

- G. Provide isolation valves on each side of strainer.
- H. Install piping sufficiently below structure to allow top air vents.
- I. Cap all pipe openings during construction until final connections are made. Also caps or plugs for end of line valves until final connections are made.
- J. Provide approved, listed fire-stopping materials for any piping which pass through fire partitions, rated walls, or floors. Coordinate with Architectural specifications.
- K. Install piping parallel or at right angles to the building, straight, plumb, and level (or at slope as required). Piping shall be pitched for drainage at a uniform slope to drainage points.

3.10 EXCAVATION, TRENCHING AND BACKFILLING

- A. Do all excavating and backfilling necessary for the installation of this work. This shall include the cutting of sidewalks and pavings if required.
- B. All work under this heading shall be in accordance with Section 31 (earthwork section) of these specifications.
- C. Where trenches cross roads, walks, or public thoroughfares, provide suitable barricades and bridges adequately protected by signs or red flags during the day and lights at night.
- D. No piping shall be concealed or buried before inspection by authorized person.
- E. All trenches shall be dug to exact grade and depth with only sufficient dirt removed to provide working space. Trenches shall be dug 6" below the required depth and shall be refilled to proper depth with sand. Accurately grade sand in bottom of trenches to provide uniform bearing and support for each section of pipe at every point along its length. Trenches shall not be more than 18" wider than the external diameter of the pipe or duct and the sides shall be as perpendicular as possible. Trenches shall be shored or sheet piled if necessary to prevent caving and to protect the work of other contractors of existing structure.
- F. All excavations shall be refilled with sand to 6" above piping and the rest with loosen granular, moist earth thoroughly tamped. Compact backfill to 95% of maximum density within limits of building, under sidewalks, under slabs on grade, and under asphalt or concrete paving.
- G. After the trench is backfilled per specifications to within 12" of the finished grade, install a detectable pipe locating tape over the entire piping runs. The backfill shall be sufficiently leveled so that the tape will be installed on a flat surface. The tape shall be centered in the trench and laid flat with printed side up. Caution shall be exercised to avoid displacement of tape and to ensure its integrity. The tape shall consist of a minimum 4.0 mil thickness, inert polyethylene plastic which is impervious to all known alkalis, acids, chemicals, reagents and solvents likely to be encountered in the soil, with a minimum 1/3 mil metallic foil. The tape shall be at least three inches in width and shall be yellow in color with identifying print in black letters. The tape shall have printed thereon the following:

CAUTION - BURIED PIPELINES BELOW

The identifying lettering shall be 1" high and repeated continuously the full length of the

tape. In no instance shall the spacing of the individual segment of the identifying message be greater than eight inches. Approved detection tape manufactures are Reef Industries, Alarmatape, and Linetec, Inc. The remainder of the trench shall be backfilled and compacted in accordance with these specifications.

- H. Coordinate all trenching with operation "Blue stake", as applicable.
- I. Underground private sewer lines outside the building structure shall have a green #18 tracer wire securely attached to it at 8' O.C. and shall have 12" of tracer wire accessible above grade at the cleanout and be securely attached at that point.
- J. Underground water lines outside the building structure shall have a blue #18 tracer wire securely attached to it at 8' O.C. and shall have 12" of tracer wire accessible above grade at the termination and be securely attached at that point.

3.11 TESTS AND ADJUSTMENTS

- A. All waste, vent, rainwater, and water piping shall be tested per International Plumbing Code before being concealed in any way. All joints shall be made driptight before being concealed. Domestic water piping shall be tested at 1-1/2 times working pressure or 100 psig, whichever is greater, for at least 15 minutes. Test on building drain and vent piping and rainwater piping shall be made with hydrostatic pressure to minimum 10'-0" head for at least 15 minutes.
- B. Piping shall not be insulated or covered until tested and approved.
- C. Chilled and heating water piping shall be pressure tested to 100 psig.
- D. Refrigeration piping for the single ductless split system air conditioning unit shall have a triple evacuation with dry nitrogen and a 12 hour holding tests inspected by Architect's representative.
- E. Refrigerant piping for variable refrigerant volume air conditioning system shall be evacuated per the manufacturer's installation guidelines. The mechanical contractor shall take time-stamped picture of all gauges at the start and finish of refrigerant piping testing to confirm the piping was tested per the manufacturer's recommendations. The pictures shall be included with the O&M documentation.

3.12 ACTIVE SERVICES

- A. When encountered in work, active electric, steam, water, gas and sewer services shall be protected against damage due to construction work. If active services are encountered which require relocation, make request to proper authorities for determinations of procedure. Do not prevent or disturb operation of active services that are to remain.

END OF SECTION

**SECTION 23 30 00
AIR DISTRIBUTION**

PART 1 – GENERAL:

1.01 WORK INCLUDED

- A. Ducts
- B. Duct Accessories
- C. Air Outlets and Inlets
- D. Air Cleaning Devices

1.02 RELATED SECTIONS

- A. Section 23 05 00 - Basic Mechanical Materials and Methods
- D. Section 23 05 93 - Testing, Adjusting, and Balancing.
- B. Section 23 07 00 - Mechanical Insulation
- C. Section 23 09 00 - Controls

1.03 QUALITY ASSURANCE

- A. The following is a list of additional equipment approved for use on this project.
 - 1. AIR DEVICES: Krueger, Price, Titus, Nailor
 - 2. SPIRAL DUCT: General Metals, Metal Manufacturing, Graco, Spiro FAB Inc., Spiral Pipe of Texas, CA Systems Inc.
 - 3. FLEXIBLE DUCT: Thermaflex, ATCO
 - 4. AIR FILTERS: Farr, Flanders
 - 5. DUST COLLECTORS: Jet, Powermatic, General, Delta, Rikon
 - 5. DUCT FITTINGS: Flexmaster, Air Tight Inc., Metal Masters
 - 6. SOUND TRAPS: VibroAcoustics or prior approved equal

1.04 SUBMITTALS (also refer to Section 23 05 00)

- A. Before beginning work, submit shop drawings or literature bound on the following items:
 - 1. Air Devices
 - 2. Air Filters
 - 3. Duct Accessories
 - 4. Sound Traps
 - 5. Ductwork
 - 6. Other equipment as directed by the Architect.

PART 2 - PRODUCTS:

2.01 DUCTS

- A. Metal Ducts:
 - 1. All metal ductwork shall be constructed of new galvanized steel ASTM A 527, G90 of lock-forming quality.
 - 2. Ductwork gauges shall be according to latest SMACNA "HVAC Duct Construction Standards" for the 2" W.G. pressure class unless otherwise specified.

- a. All duct joints shall be sealed with Hardcast FG1402-181BFX foil-grip tape or Hardcast VG-181 duct sealant. Material used for joining ducts shall be UL181 listed.
- b. Branch duct connections manufactured by "Air-Tite Inc." (1-501-935-8483) may be used in lieu of spin-in collars but must still be sealed with hardcast.

B. Flexible Ducts:

- 1. Low pressure and medium pressure flexible duct shall be Thermaflex M-KC Class 1 duct with bi-directional reinforced metalized vapor barrier with triple ply stand-up seam. Woven and coated fiberglass fabric permanently bonded to a coated spring steel wire helix and supporting a thick blanket of fiber glass insulation. Velocity rating: 6000 FPM. Minimum positive pressure for all sizes shall be 10" w.c. Minimum negative pressure for all sizes shall be 2" w.c.

2.02 DUCT ACCESSORIES

A. Volume Control Dampers:

- 1. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
 - a. Fabricate single blade dampers for duct sizes to 9-1/2 x 30 inch (240 x 760 mm).
 - b. Fabricate multi-blade damper of opposed blade pattern with maximum blade sizes 12 x 72 inch (300 x 1 825 mm). Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
 - c. Except in round ductwork 12 inches (300 mm) in diameter and smaller, provide end bearings.
 - d. Provide locking, indicating quadrant regulators on single and multi-blade dampers. Where width exceeds 30 inches (750 mm), provide regulator at both ends.

B. Flexible Connections:

- 1. Provide Duro Dyne UL approved neoprene-coated fiberglass flexible connection at inlet and outlet of all air moving devices.
- 2. Equivalent manufacturer: Ductmate Industries

C. Weatherproofing:

- 1. Caulk watertight all ductwork exposed to the weather with DAP "CMC" exterior duct sealant, Hardcast Versa Grip "VG-102", or Design Polymerics DP 1010.

D. Sound Traps:

- 1. Contractor shall furnish and install prefabricated silencers in the air handling system of the sizes and performances shown on the drawings. They shall be the

product of a nationally known manufacturer who has engaged in the manufacture and distribution of this type of equipment for at least five (5) years.

2. Outer casing be of not less than 22 gauge galvanized steel construction. All external seams shall be lockformed and filled with mastic, or continuously welded, and shall be airtight up to 10" water guard pressure differential. Casings should be suitable stiffened to prevent permanent deformation when tested at 10" pressure differential, they shall not vibrate audibly during normal operation of air handling system.
3. Interior partitions shall be of not less than 24 gauge galvanized steel perforated to remove not more than 18% of the area. Acoustically absorptive filler material made from an inorganic fiber-glass like material (mineral wool or spun felt) shall be compressed not less than 5% to eliminate voids and prevent settling. Material shall be vermin and moisture proof and impart no odor to the air.
4. Incombustible filler material shall exhibit not more than the following fire hazard classification values when tested in accordance with standard ASTM E84, NFPA 255, or UL-723 test methods:

(a)	FLAMESPREAD	15
(b)	FUEL CONTRIBUTED	15
(c)	SMOKE DEVELOPED	0
5. All rating shall be based on test data from a nationally known qualified Independent Laboratory.

2.03 AIR OUTLETS AND INLETS

- A. Ceiling Diffusers: Krueger SH Series; flush louvered face diffuser with removable core, all steel construction and 1, 2, 3, or 4-way discharge patterns. White finish. T-bar or surface mounted per plans.
- B. Grilles: Krueger EGC-5 Series extruded aluminum frame, fixed core of 1/2" x 1/2" x 1/2" fabricated aluminum squares.

2.04 AIR CLEANING DEVICES

- A. Filters:
 1. Disposable, Extended Area Panel Filters: Pleated, reinforced cotton fabric; supported and bonded to welded wire grid; enclosed in cardboard frame; nominal size as indicated on drawings 2 inches thick; rated 25-30 percent average dust spot efficiency.
 2. Filter Frames: Galvanized steel or extruded aluminum T-section construction with necessary gasketing between frames and walls.

2.05 DUST COLLECTORS

- A. Provide three (3) Jet model DC-1100VX-5M single stage dust collectors with 5-micron filter and collector bag.
- B. Dust collector shall have one 6" hose connection and two 4" hose connections. The fan impeller shall be 11" in diameter and shall be constructed of steel. The fan motor shall be

1½ HP at 115/230 volts (11/5.5 amps).

- C. Dust collectors shall be complete with a 5-year parts warranty.

PART 3 - EXECUTION:

3.01 INSTALLATION

- A. Install flexible connections between fan or motorized equipment and ductwork. Flexible connectors shall not be in tension while running.
- B. Prevent passage of unfiltered air around filters with felt, rubber, or neoprene gaskets.
- C. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, and elsewhere as indicated. Provide minimum 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access.
- D. Provide balancing dampers on duct take-off to diffusers, grilles and registers. Dampers provided as part of the diffuser, grille or register assembly will not be accepted.
- E. Install a new set of filters after final inspection.

3.02 DUCTS

- A. Furnish and install all sheet metal ducts together with necessary dampers, supports and other items required for a complete installation.
- B. All ductwork shall, where practicable, be run parallel to or at right angles to the lines of the building.
- C. All rectangular duct branch take-offs shall be made with 45 degree fittings with main duct size reduction downstream.
- D. All duct work shall be hung with sheet metal strap hangers per latest SMACNA "HVAC Duct Construction Standards" fastened to structure above.
- E. The sizes of internally lined ducts (where allowed by 23 07 00) are actual outside duct dimensions.
- F. Inside radius of all elbows shall be not less than 6" and shall incorporate turning vanes as shown on drawings. Turning vanes shall be single thickness with standard metal runners as manufactured by Duro Dyne or Aero Dyne and installed per SMACNA. Note: Elbows called out on the plans to be used specifically for sound attenuation shall be square, lined with insulation, and have no turning vanes.
- G. Reducing elbows with turning vanes shall not be used. All elbows with turning vanes shall have the same inlet and outlet sizes with transitions as necessary downstream of the elbow.
- H. Changes in duct sizes or shape shall be made with transitions as long as practicable. The absolute maximum angle between the side and axis of the duct shall be 30 degrees divergence or 45 degrees convergence.
- I. Exposed ductwork passing through walls shall be provided with sheet metal flashings covering entire opening. Flashing shall be same gauge as duct with mitered corners and

hemmed edges.

- J. Extractors shall not be used.
- K. All branch duct connections shall be factory made 45 degree take offs. No straight taps or field connections allowed.
- L. Flexible duct connections shall be made with metal type hose clamps per installation recommended by manufacturer and as required by UL 181 label procedure.
- M. Where ductwork passes through roof, provide curbs and flashings in accordance with details on Architectural drawings or as directed by Architect.
- N. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- O. Ductwork shall be stored in a clean location prior to installation. Openings shall be covered to prevent entry of dust, moisture, and general construction dirt/debris. 10 mil plastic sheeting securely taped over open ends will be acceptable.

END OF SECTION

SECTION 23 70 00
HEATING, VENTILATING, AND AIR CONDITIONING EQUIPMENT

PART 1 - GENERAL:

1.01 WORK INCLUDED

- A. Air Handling Units
- B. VRV Air Conditioning Equipment

1.02 RELATED DOCUMENTS

- A. Section 23 05 00 – Basic Mechanical Materials and Methods
- B. Section 23 05 93 – Testing, Adjusting, and Balancing
- C. Section 23 09 00 – Energy Monitoring and Control System

1.03 QUALITY ASSURANCE

- A. The following is a list of additional equipment approved for use on this project.
 - 1. AIR HANDLING UNITS: Trane, Carrier, York, McQuay
 - 2. VRV AIR CONDITIONING EQUIPMENT: Daikin, Mitsubishi

1.04 SUBMITTALS

- A. Before beginning work, submit shop drawings or literature bound on the following items:
 - 1. Air Handling Units
 - 2. VRV Air Conditioning Equipment

PART 2 - PRODUCTS:

2.01 AIR HANDLING UNITS

- A. Units shall ship in the number of sections necessary to meet project requirements and shall ship in as many splits as specified in selection software. Split options as follows:
 - 1. Shipped in sections — shipping split
 - 2. Shipped assembled
- B. Unit shall be factory-supplied, factory-assembled, outdoor, curb-mounted central station air handler. The air-handling unit may consist of all sections as indicated on the construction documents.

2.02 CASING

- A. Construction:
 - 1. Unit shall be constructed of a complete frame with easily removable panels. Removal of any panel shall not affect the structural integrity of the unit.
 - 2. All units shall be supplied with a perimeter, 14-gage or heavier, G-90 galvanized,

high tensile steel base rail with a pocket to accommodate roof curb. Perimeter lifting lugs for overhead lifting shall be provided. Slings units in place of lifting lugs shall not be acceptable.

3. Unit shall be thermally broken to minimize the conduction path from the inside of the casing to the outside.
4. Casing panels (top, sides, and bottom) shall be constructed of galvanized steel, and shall have one of the following exterior finishes as specified:
 - a. Pre-painted with a baked enamel finish passing 500-hour salt spray test (ASTM B-117) for pre-painted steel and 125-hour marine level 1 prohesion test (ASTM G-85.A5) for pre-painted steel.
5. Casing panels (top, sides, and bottom) shall be constructed of galvanized steel, and shall have one of the following interior finishes as specified:
 - a. Pre-coated with a silver zeolite antimicrobial material registered by the US EPA for use in HVAC applications.
6. Roof shall be double-wall, pitched in four directions at a minimum roof slope of 1/4-in. per foot across the width of the unit. No penetrations shall be made in pressure sensitive panels. Roof shall incorporate a standing top seam. All seams in the roof shall be gasketed and capped to prevent water infiltration into the unit.
7. Casing panels (top, sides, and bottom) shall be one piece double-wall construction with insulation sealed between the inner and outer panels. Panel assemblies shall not carry an R-value of less than 13.
8. Casing deflection shall not exceed a 1:200 ratio when subject to an internal pressure of ± 8 -in. wg. Casing leakage rate shall be less than 1% at ± 8 in. wg of nominal unit airflow or 50 cfm, whichever is greater. Leakage rate shall be tested and documented on a routine basis on random production units. Optionally, factory witness leak testing and/or test reports shall be available.
9. Side panels shall be easily removable for access to unit and shall seal against a full perimeter automotive style gasket to ensure a tight seal.
10. The panel retention system shall comply with UL 1995 which states all moving parts (for example, fan blades, blower wheels, pulleys, and belts) that, if accidentally contacted, could cause bodily injury, shall be guarded against accidental contact by an enclosure requiring tools for removal.
11. Base rail shall overhang the curb to facilitate water run-off and protection of the curb to base connection from water intrusion.
12. Accessibility options shall be as follows:
 - a. Hinged double-wall access door on either side with removable access panel(s) on the other side.
13. Fan supports, structural members, panels, or flooring shall not be welded, unless aluminum, stainless steel, or other corrosion-resistant material is used. Painted

welds on unit exterior steel or galvanized steel are not acceptable.

14. All coil sections shall be solid double-wall construction with insulation sealed between the inner and outer panels. Panel assemblies shall not carry an R-value of less than 13.

B. Access Doors:

Access doors shall be one piece double-wall construction with insulation sealed between the inner and outer panels. Panel assemblies shall not carry an R-value of less than 13.

C. Drain Pans:

Drain pans shall be insulated double-wall stainless steel construction. The pan shall be sloped toward the drain connection. Drain pan shall have 1½-in. MPT connection exiting through the hand side or opposite side of the casing as specified. Drain connection shall be insulated from the drain pan to the point at which it exits the casing. One drain outlet shall be supplied for each cooling coil section. Drain pan shall allow no standing water and comply with ASHRAE Standard 62. Where 2 or more coils are stacked in a coil bank, intermediate drain pans shall be provided and the condensate shall be piped to the bottom drain pan. The bottom coil shall not serve as a drain path for the upper coil.

D. Roof Curbs:

1. Roof curb shall be delivered to jobsite in an unassembled, knockdown state.
2. Curb shall be constructed of 14-gage G-90 galvanized steel, 14 inches in height.
3. Full perimeter wood nailers shall be securely mounted to curb sheet metal.
4. Curb channel supports will be supplied on all curbs exceeding 10 ft in total unit airway length.
5. Gasketing between curb and unit shall be shipped for field installation with the unit curb.

E. Hoods and Louvers:

1. Outside Air Hoods:

- a. Outside air hoods shall be constructed of 20-gage galvanized G-90 steel and sized for 100% of unit nominal cfm.
- b. Hoods shall include easily accessible 1-in. moisture eliminators with a maximum velocity of no more than 500 fpm.

2. Side Intake Louvers:

- a. Frames and blades shall be 6063 alloy, 0.081 in. thick, mechanically fastened with stainless steel fasteners. Frame depth shall be 6 inches.
- b. Vertical blades shall be designed to collect and drain water to exterior at sill by means of a center rain hook and channels in jambs and mullions.

- c. Louvers shall have 1/2-in. mesh removable aluminum bird screen.
- d. Visible mullions required for louver widths greater than 96 inches.
- e. Provide sill-flashing pans 4 in. high by full depth formed from minimum 0.060 in. thick aluminum.
- f. Louvers shall be designed to withstand a wind load of 25 lb per sq ft.
- g. Water penetration shall be no more than 0.01 oz per sq ft of free area at 1250 fpm per AMCA publication 511. The AMCA test was unable to determine the beginning water penetration for this louver due to the fact that it lies above 1250 fpm through free area.
- h. Louver shall have a mill finish.

2.03 FANS

A. General:

- 1. Forward-curved fans shall have one double-width double-inlet (DWDI) fan wheel and scroll. They shall be constructed of galvanized steel with baked enamel. They shall be designed for continuous operation at the maximum rated fan speed and motor horsepower. Fans shall have an AMCA class rating corresponding to the static pressure at which the fan is designed to operate (Class I or II). Completed fan assembly shall be dynamically balanced in accordance with 1989 ARI Guideline G and ANSI S2.19-1986 at design operating speed using contract drive and motor if ordered.
- 2. Fan wheels shall be keyed to the shaft and shall be designed for continuous operation at maximum rated fan speed and motor horsepower. Fan wheels and shafts shall be selected with a maximum operating speed 25% below the first critical.
- 3. Fan motor shall be mounted within the fan section casing on slide rails equipped with adjusting screws. Motor shall be premium efficiency, open drip-proof or totally enclosed fan cooled NEMA Design B with size and electrical characteristics as shown on the equipment schedule. Motor shall be mounted on a horizontal flat surface and shall not be supported by the fan or its structural members. All three-phase motors shall have a $\pm 10\%$ voltage utilization range and a 1.15 minimum service factor. Motor shall be compliant with the Energy Independence and Security Act (EISA) of 2007 where applicable. Single-phase motors shall be available up to and including 5 hp.

B. Performance Ratings:

Fan performance shall be rated and certified in accordance with AHRI Standard 430.

- C. Sound Ratings: Manufacturer shall submit first through eighth octave sound power for fan discharge and casing radiated sound.
- D. Mounting:

Fan scroll, wheel, shaft, bearings, drives, and motor shall be mounted on a common base assembly. The base assembly is isolated from the outer casing with factory-installed isolators and vibration absorbent an discharge seal. A canvas style duct connection between fan discharge and cabinet is not acceptable. Units shall use 2-in. deflection spring isolators.

E. Fan Accessories:

1. Forward curved fans:

- a. Belt guards
- b. Inlet screen

F. Flexible Connection:

The base assembly is isolated from the outer casing with factory-installed isolators and vibration absorbent fan discharge seal. A canvas style duct connection between fan discharge and cabinet is not acceptable.

2.04 BEARINGS AND DRIVES

A. Bearings:

Self-aligning, grease lubricated, anti-friction with lubrication fittings extended to drive side of fan section. Optional grease fittings extended to the exterior of the casing are available.

1. Size 03 to 110 forward-curved fans: Cartridge type bearings for Class I fans. Heavy-duty pillow block type, self-aligning, regreasable ball or roller type bearings selected for a minimum average life (L₅₀) of 200,000 hours or optionally for an (L₅₀) of 500,000 hours.

B. Shafts:

Fan shafts shall be solid steel, turned, ground, polished and coated with a rust inhibitor.

C. V-Belt Drive:

Drive shall be designed for a minimum 1.2 service factor as standard with a 1.5 service factor option and/or a factory-supplied extra set of belts. Drives shall be fixed pitch with optional variable pitch for motors 15 hp and less. All drives shall be factory mounted, with sheaves aligned and belts properly tensioned.

2.05 COILS

- A. All coils shall be provided to meet the scheduled performance. All coil performance shall be certified in accordance with AHRI Standard 410. All water coils shall be tested at 450 psig air pressure.

B. General Fabrication:

1. All water and refrigerant coils shall have minimum 1/2-in. OD copper tubes mechanically expanded into fins to ensure high thermal performance with lower

total flow and pumping requirements. Minimum tube wall thickness shall be 0.025 inches.

2. Aluminum plate fin type with belled collars.
3. Aluminum-finned coils shall be supplied with die-formed casing and tube sheets of mill galvanized steel or stainless steel as specified.

C. Hydronic Heating and Cooling Coils:

1. Headers shall be constructed of steel with steel MPT connections. Headers shall have drain and vent connections accessible from the exterior of the unit. Optional non-ferrous headers and red brass nipples shall be supplied if specified.
2. Configuration: Coils shall be drainable, with non-trapping circuits. Coils will be suitable for a design working pressure of 300 psig at 200 F.
3. The manufacturer shall furnish an integral control box containing thermal cutouts, primary control, subcircuit fusing, airflow switch, and fused control transformer.

2.06 FILTER SECTIONS

- A. Angle filter sections shall accept either 2-in. or 4-in. filters of standard sizes, arranged in a horizontal V formation.

2.07 DAMPERS

- A. Mixing boxes, filter-mixing boxes, and exhaust boxes shall have parallel blades and interconnecting outside-air and return-air dampers.

1. Standard Dampers:

Damper blades shall be constructed of galvanized steel, with blade seals and stainless steel jamb seals. Blades shall be mechanically fastened to axle rods rotating in self-lubricating synthetic bearings. Maximum leakage rate shall be 4 cfm/ft² at 1 in. wg (0.25 kPa) differential pressure.

2.08 VARIABLE REFRIGERANT VOLUME

A. System Description

1. The variable capacity, heat pump system shall be a Daikin Variable Refrigerant Volume Series split system. Alternate manufacturers are listed in section 1.03 and must meet the requirements of section 3.02 prior to bid opening and after notice of award.
2. The heat pump system shall consist of multiple evaporators, manufacturer approved joints and headers, a two-pipe refrigeration distribution system using PID control, and an outdoor unit.
3. The outdoor unit is a direct expansion (DX), air-cooled heat pump, multi-zone air-conditioning system with variable speed inverter driven compressors using R-410A refrigerant. The outdoor unit may connect an

indoor evaporator capacity up to 200% of the outdoor condensing unit capacity. All zones are each capable of operating separately with individual temperature control.

4. The outdoor unit shall be interconnected to indoor unit and shall range in capacity from 7,500 Btu/h to 54,000 Btu/h in accordance with manufacturer's engineering data book detailing each available indoor unit. The indoor units shall be connected to the outdoor utilizing manufacturer's approved piping joints and headers.
5. Operation of the heat pump system shall permit either cooling or heating of all of the indoor units. Each indoor unit or group of indoor units shall be able to provide set temperature independently via a local remote controller, an Intelligent Controller, an Intelligent Manager or a BMS interface.

B. Features and Benefits

1. Voltage Platform – Heat pump condensing units shall be available with a 208-230V/3/60 power supply.
2. Advanced Zoning – A single system shall provide for up to 41 zones.
3. Autocharging – Each system shall have a refrigerant auto-charging function.
4. Charge Checking – Each system shall have a refrigerant charge checking function.
5. Defrost Heating – Manifolded and 12 ton systems shall maintain continuous heating during defrost operation.
6. Oil Return Heating – Each system shall maintain continuous heating during oil return operation.
7. Independent Control – Each indoor unit shall use a dedicated electronic expansion valve for independent control.
8. VFD Inverter Control – Each condensing unit shall use a high efficiency, variable speed "inverter" compressor coupled with inverter fan motors for superior part load performance. Compressor capacity shall be modulated automatically to maintain a constant suction pressure, while varying the refrigerant volume for the needs of the cooling or heating loads. Indoor indoor units shall use PID control to control superheat to deliver a comfortable room temperature condition.
9. Flexible Design:
 - a. Systems shall be capable of up to 540ft (640ft equivalent) of linear piping between the condensing unit and furthest located indoor unit.
 - b. Systems shall be capable of up to 3,280ft total "one-way" piping in the piping network.
 - c. Systems shall have a vertical (height) separation of up to 295ft between the condensing unit and the indoor units.

- d. Systems shall be capable of 295ft from the first REFNET™ / branch point.
 - e. The outdoor unit shall connect an indoor unit evaporator capacity up to 200% of the outdoor condensing unit capacity.
 - f. Systems shall be capable of 49ft between indoor units.
 - g. Condensing units shall be supported with a fan/fan motor ESP up to 0.32" WG as standard to allow connection of discharge ductwork and to prevent discharge air short circuiting.
- 10. Simple Wiring – Systems shall use 16 AWG, 2 wire, multi-stranded, non-shielded and non-polarized daisy chain control wiring.
 - 11. Energy Efficiency – System shall have equivalent or better performance than high efficiency air cooled or water cooled chiller systems.
 - 12. Outside Air – Systems shall provide outside air capability.
 - 13. Space Saving – Each system shall have a condensing unit module footprint as small as 3' 5/8" x 2' 6-1/8" (7.66sq ft).
 - 14. Advanced Diagnostics – Systems shall include a self diagnostic, auto-check function to detect a malfunction and display the type and location.
 - 15. Advanced Controls – Each system shall have at least one remote controller capable of controlling up to 16 indoor units.
 - a. Each system shall be capable of integrating with open protocol BACnet building management systems.
 - 16. Low Sound Levels – Each system shall use indoor and outdoor units with quiet operation as low as 29 dB(A).

C. Quality Assurance

- 1. The units shall be tested by a Nationally Recognized Testing Laboratory (NRTL), in accordance with ANSI/UL 1995 – Heating and Cooling Equipment and bear the Listed Mark.
- 2. All wiring shall be in accordance with the National Electric Code (NEC).
- 3. The system will be produced in an ISO 9001 and ISO 14001 facility, which are standards set by the International Standard Organization (ISO). The system shall be factory tested for safety and function.
- 4. Mechanical equipment for wind-born debris regions shall be designed in accordance with ASCE 7-2002 and installed to resist the wind pressures on the equipment and the supports.
- 5. The outdoor unit will be factory charged with R410A.

D. Refrigerant Piping

- 1. The system shall be capable of refrigerant piping up to 540 actual feet or 620

equivalent feet from the outdoor unit to the furthest indoor unit, a total combined liquid line length of 3,280 feet of piping between the condensing and indoor units with 295 feet maximum vertical difference, without any oil traps.

2. Manufacturer approved piping joints and headers shall be used to ensure proper refrigerant balance and flow for optimum system capacity and performance.

E. Outdoor Unit

1. The outdoor unit shall be designed specifically for use with the associated indoor units.
 - a. The outdoor unit shall be factory assembled and pre-wired with all necessary electronic and refrigerant controls. The refrigeration circuit of the condensing unit shall consist of scroll compressors, motors, fans, condenser coil, electronic expansion valves, solenoid valves, 4-way valve, distribution headers, capillaries, filters, shut off valves, oil separators, service ports and refrigerant regulator.
 - b. High/low pressure gas line, liquid and suction lines must be individually insulated between the outdoor and indoor units.
 - c. The outdoor unit can be wired and piped with outdoor unit access from the left, right, rear or bottom.
 - d. The connection ratio of indoor units to outdoor unit shall be permitted up to 200%.
 - e. Each outdoor system shall be able to support the connection of up to 41 indoor units dependant on the model of the outdoor unit.
 - f. The sound pressure level standard shall be that value as listed in the engineering manual for the specified models at 3 feet from the front of the unit. The outdoor unit shall be capable of operating automatically at further reduced noise during night time.
 - g. The system will automatically restart operation after a power failure and will not cause any settings to be lost, thus eliminating the need for reprogramming.
 - h. The unit shall incorporate an auto-charging feature and a refrigerant charge check function.
 - i. The outdoor unit shall be modular in design and should allow for side-by-side installation with minimum spacing.
 - j. The following safety devices shall be included on the condensing unit; high pressure switch, control circuit fuses, crankcase heaters, fusible plug, high pressure switch, overload relay, inverter overload protector, thermal protectors for compressor

and fan motors, over current protection for the inverter and anti-recycling timers.

- k. To ensure the liquid refrigerant does not flash when supplying to the various indoor units, the circuit shall be provided with a sub-cooling feature.
- l. Oil recovery cycle shall be automatic occurring 2 hours after start of operation and then every 8 hours of operation.
- m. The outdoor unit shall be capable of heating operation at 0°F dry bulb ambient temperature without additional low ambient controls.
- n. The system shall continue to provide heat to the indoor units while in the defrost mode.

2. Unit Cabinet:

- a. The outdoor unit shall be completely weatherproof and corrosion resistant. The unit shall be constructed from rust-proofed mild steel panels coated with a baked enamel finish.

3. Condenser Fan:

- a. The condensing unit shall consist of one or more propeller type, direct-drive 350 and 750 W fan motors that have multiple speed operation via a DC (digitally commutating) inverter.
- b. The condensing unit fan motor shall have multiple speed operation of the DC (digitally commutating) inverter type, and be of high external static pressure and shall be factory set as standard at 0.12 in. WG. A field setting switch to a maximum 0.32 in. WG pressure is available to accommodate field applied duct for indoor mounting of condensing units.
- c. The fan shall be a vertical discharge configuration with a nominal airflow maximum range of 6,530 CFM to 14,120 CFM dependant on model specified.
- d. Nominal sound pressure levels shall be as shown below.

Model Number	Sound Pressure Level dB(A)
RXYQ72PAYD	58

- e. The fan motor shall have inherent protection and permanently lubricated bearings and be mounted.
- f. The fan motor shall be provided with a fan guard to prevent contact with moving parts.

- g. Night setback control of the fan motor for low noise operation by way of automatically limiting the maximum speed shall be a standard feature. Operation sound level shall be selectable from 3 steps as shown below.

Operation Sound (dB)	Night Mode Sound Pressure Level (dB)
Step 1 max.	55
Step 2 max.	50
Step 3 max.	45

4. Condenser Coil:

- a. The condenser coil shall be manufactured from copper tubes expanded into aluminum fins to form a mechanical bond.
- b. The heat exchanger coil shall be of a waffle louver fin and rifled bore tube design to ensure high efficiency performance.
- c. The heat exchanger on the condensing units shall be manufactured from Hi-X seamless copper tube with N-shape internal grooves mechanically bonded on to aluminum fins to an e-Pass Design.
- d. The fins are to be covered with an anti-corrosion acrylic resin and hydrophilic film type E1.
- e. The pipe plates shall be treated with powdered polyester resin for corrosion prevention. The thickness of the coating must be between 2.0 to 3.0 microns.

5. Compressor:

- a. The inverter scroll compressors shall be variable speed (PAM inverter) controlled which is capable of changing the speed to follow the variations in total cooling and heating load as determined by the suction gas pressure as measured in the condensing unit. In addition, samplings of evaporator and condenser temperatures shall be made so that the high/low pressures detected are read every 20 seconds and calculated. With each reading, the compressor capacity (INV frequency or STD ON/OFF) shall be controlled to eliminate deviation from target value.
- b. The inverter driven compressor in each condensing unit shall be of highly efficient reluctance DC (digitally commutating), hermetically sealed scroll "G-type" with a maximum speed of 7,980 rpm.
- c. Neodymium magnets shall be adopted in the rotor construction to yield a higher torque and efficiency in the compressor instead of the normal ferrite magnet type. At complete stop of the

compressor, the neodymium magnets will position the rotor into the optimum position for a low torque start.

- d. The capacity control range shall be as low as 6% to 100%.
- e. Each non-inverter compressor shall also be of the hermetically sealed scroll type.
- f. Each compressor shall be equipped with a crankcase heater, high pressure safety switch, and internal thermal overload protector.
- g. Oil separators shall be standard with the equipment together with an intelligent oil management system.
- h. The compressor shall be spring mounted to avoid the transmission of vibration.
- i. Heat pump units sized 8-12 tons shall contain a minimum of 2 compressors. Heat pump units sized 14-20 tons shall contain a minimum of 4 compressors. Heat recovery units sized 8-12 tons shall contain a minimum of 2 compressors. Heat recovery units sized 14-16 tons shall contain a minimum of 3 compressors. Heat recovery units sized 18-20 tons shall contain a minimum of 4 compressors.
- j. In the event of compressor failure the remaining compressors shall continue to operate and provide heating or cooling as required at a proportionally reduced capacity. The microprocessor and associated controls shall be designed to specifically address this condition.
- k. In the case of multiple condenser modules, conjoined operation hours of the compressors shall be balanced by means of the Duty Cycling Function, ensuring sequential starting of each module at each start/stop cycle, completion of oil return, completion of defrost or every 8 hours.

6. Electrical:

- a. The power supply to the outdoor unit shall be 208-230 volts, 3 phase, 60 hertz +/- 10%.
- b. The control voltage between the indoor and outdoor unit shall be 16VDC non-shielded, stranded 2 conductor cable.
- c. The control wiring shall be a two-wire multiplex transmission system, making it possible to connect multiple indoor units to one outdoor unit with one 2-cable wire, thus simplifying the wiring operation.
- d. The control wiring lengths shall be as shown below.

	Outdoor to Indoor Unit	Outdoor to Central Controller	Indoor Unit to Remote Control
Control Wiring Length	6,665 ft	3,330 ft	1,665 ft
Wire Type	16 AWG, 2 wire, non-polarity, non-shielded, stranded		

F. Indoor Units

1. Way Ceiling Cassette Unit (2'x2')

- a. Ceiling cassette fan coil unit shall be operable with R-410A refrigerant, equipped with an electronic expansion valve, for installation into the ceiling cavity equipped with an air panel grill. It shall be available from 7,500 Btu/h to 18,000 Btu/h.
- b. It shall be a four-way air distribution type, ivory white, impact resistant with a washable decoration panel. The supply air is distributed via motorized louvers which can be horizontally and vertically adjusted from 0° to 90°.
- c. Computerized PID control shall be used to control superheat to deliver a comfortable room temperature condition. The unit shall be equipped with a programmed drying mechanism that dehumidifies while inhibiting changes in room temperature.
- d. The indoor units sound pressure shall range from 29 dB(A) to 34 dB(A) at low speed measured at 5 feet below the unit.
- e. Each unit's performance is based on nominal operating conditions:
- f. Indoor Unit:
 1. The indoor unit shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, electronic proportional expansion valve, control circuit board, fan motor thermal protector, flare connections, condensate drain pan, condensate drain pump, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch.
 2. Indoor unit and refrigerant pipes will be charged with dehydrated air prior to shipment from the factory.
 3. Both refrigerant lines shall be insulated from the outdoor unit.
 4. The 4-way supply air flow can be field modified to 3-way and 2-way airflow to accommodate various installation configurations including corner installations.
 5. Return air shall be through the concentric panel, which includes a resin net mold resistant filter.

6. The indoor units shall be equipped with a condensate pan and condensate pump. The condensate pump provides up to 21" of lift.
7. The indoor units shall be equipped with a return air thermistor.
8. The indoor unit will be separately powered with 208V/1-phase/60Hz.
9. The voltage range will be 253 volts maximum and 187 volts minimum.

g. Unit Cabinet:

1. The cabinet shall be space saving and shall be located into the ceiling.
2. Three auto-swing positions shall be available to choose, which include standard, draft prevention and ceiling stain prevention.
3. The airflow of the unit shall have the ability to shut down one or two sides allowing for simpler corner installation.
4. Fresh air intake shall be possible by way of fresh air intake kit.
5. A branch duct knockout shall exist for branch ducting supply air.
6. The cabinet shall be constructed with sound absorbing foamed polystyrene and polyethylene insulation.

h. Fan:

1. The fan shall be direct-drive turbo fan type with statically and dynamically balanced impeller with high and low fan speeds available.
2. The fan motor shall operate on 208 volts, 1 phase, 60 hertz with a motor output range from 0.06 to 0.12 HP.
3. The airflow rate shall be available in high and low settings.
4. The fan motor shall be thermally protected.

i. Filter:

1. The return air shall be filtered by means of a washable long-life filter with mildew proof resin.

j. Coil:

1. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
2. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.
3. The coil shall be a 2-row cross fin copper evaporator coil with 17 FPI design completely factory tested.

4. The refrigerant connections shall be flare connections and the condensate will be 1 -1/32 inch outside diameter.
5. A condensate pan shall be located under the coil.
6. A condensate pump with a 21 inch lift shall be located below the coil in the condensate pan with a built in safety alarm.
7. A thermistor will be located on the liquid and gas line.

k. Electrical:

1. A separate power supply will be required of 208 volts, 1 phase, 60 hertz. The acceptable voltage range shall be 187 to 253 volts.
2. Transmission (control) wiring between the indoor and outdoor unit shall be a maximum of 3,280 feet (total 6,560 feet).
3. Transmission (control) wiring between the indoor unit and remote controller shall be a maximum distance of 1,640 feet.

l. Control:

1. The unit shall have controls provided by manufacturer to perform input functions necessary to operate the system.
2. The unit shall be compatible with interfacing with connection to BMS system.

2. Concealed Ceiling Ducted Unit

- a. Ceiling concealed fan coil unit shall be operable with refrigerant R-410A, equipped with an electronic expansion valve, for installation into the ceiling cavity. It is constructed of a galvanized steel casing. It shall be available from 30,000 Btu/h to 48,000 Btu/h capacities.
- b. It shall be a horizontal discharge air with horizontal return air configuration. All models feature a low height (15-3/8") cabinet making them applicable to ceiling pockets that tend to be shallow.
- c. Computerized PID control shall be used to control superheat to deliver a comfortable room temperature condition. The unit shall be equipped with a programmed drying mechanism that dehumidifies while inhibiting changes in room temperature.
- d. The indoor units sound pressure shall range from 41 dB(A) to 45 dB(A) at low speed measured 5 feet below the ducted unit.
- e. Each unit's performance is based on nominal operating conditions:

f. Indoor Unit:

1. The indoor unit shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, electronic proportional expansion valve, control circuit board, fan motor thermal protector, flare connections, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch. The unit shall have an adjustable external static pressure switch.
2. Indoor unit and refrigerant pipes will be charged with dehydrated air prior to shipment from the factory.
3. Both refrigerant lines shall be insulated from the outdoor unit.
4. The indoor units shall be equipped with a return air thermistor.
5. The indoor unit will be separately powered with 208V/1-phase/60Hz.
6. The voltage range will be 253 volts maximum and 187 volts minimum.

g. Unit Cabinet:

1. The cabinet shall be located into the ceiling and ducted to the supply and return openings.
2. The cabinet shall be constructed with sound absorbing foamed polystyrene and polyethylene insulation.

h. Fan:

1. The fan shall be direct-drive type fan, statically and dynamically balanced impeller with high and low fan speeds available.
2. The fan motor shall operate on 208 volts, 1 phase, 60 hertz with a motor output range 0.21, 0.36 and 0.58 HP respectively.
3. The airflow rate shall be available in high and low settings.
4. The fan motor shall be thermally protected.

i. Coil:

1. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
2. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.
3. The coil shall be a 3 row cross fin copper evaporator coil with 13 fpi design completely factory tested.
4. The refrigerant connections shall be flare connections and the condensate will be 1-1/4 inch outside diameter.
5. A thermistor will be located on the liquid and gas line.

- j. Electrical:
 - 1. A separate power supply will be required of 208/230 volts, 1 phase, 60 hertz. The acceptable voltage range shall be 187 to 253 volts.
 - 2. Transmission (control) wiring between the indoor and outdoor unit shall be a maximum of 3,280 feet (total 6,560 feet).
 - 3. Transmission (control) wiring between the indoor unit and remote controller shall be a maximum distance of 1,640 feet.
- k. Control:
 - 1. The unit shall have controls provided by manufacturer to perform input functions necessary to operate the system.
 - 2. The unit shall be compatible with interfacing with connection to BMS system.

PART 3 - EXECUTION:

3.01. QUALIFIED BIDDERS

- A. The Variable Refrigerant Volume systems must be installed by a factory trained contractor that has experience with installing at least one complete Variable Refrigerant Volume system. The bidders shall be required to submit factory training certification with bid documents. The mechanical contractor's installation price shall be based on the identified Variable Refrigerant Volume system installation requirements. The mechanical contractor bids with complete knowledge of the specific HVAC system requirements. Mechanical contractors that submit bids without factory training certifications will be considered non-responsive and will be rejected.

3.02. VARIABLE REFRIGERANT VOLUME EQUIPMENT ALTERNATES

- A. The alternate equipment supplier shall submit to the engineer and bidding mechanical contractor a complete equipment data package at least 10 days prior to the bid opening. This package shall include, but is not limited to, equipment capacities at the design condition, power requirements, indoor/outdoor sound properties, indoor units CFM/static pressures, fan curves, installation requirements, and physical dimensions and weights. Nominal performance data is not acceptable.
- B. The mechanical contractor shall list the equipment supplier and submit the required data package with the bid detailing a complete comparison of the proposed alternate equipment to the specified equipment.
- C. The alternate equipment supplier shall furnish a complete drawing package with the equipment submittal. The alternate equipment design shall be provided on 30"x42" sheets. The HVAC series design documents will be made available in electronic format for use by the equipment supplier in preparing their drawings.
- D. The alternate equipment supplier shall draft all piping circuits, components, overall building control schematic, detailed control wiring diagrams, system details and schedules

for their system. The drawings shall convey all requirements to successfully install the alternate equipment suppliers system.

- E. The submitted documents shall be complete system designs and show no less information than the HVAC equipment/controls contract bid documents.

3.03. START-UP REQUIREMENTS

- A. Do not operate units until ductwork is clean, filters are in place, bearings lubricated, condensate properly trapped, piping connections verified and leak tested, belts aligned and tensioned, all shipping braces have been removed, and fan has been test run under observation.
- B. Refrigerant piping for variable refrigerant volume air conditioning system shall be evacuated per the manufacturer's installation guidelines. The mechanical contractor shall take time-stamped picture of all gauges at the start and finish of all testing to confirm the piping was tested per the manufacturer's recommendations. The pictures shall be included with the O&M documentation.

3.04. MANNER OF PERFORMING WORK

- A. Coordinate location of piping, ductwork, sleeves, inserts, hangers and equipment for this work with other trades.
- B. All materials and equipment shall be installed in accordance with the approved recommendations and guidelines as issued by the respective manufacturers to conform with contract documents. Workmen skilled in the trades involved shall accomplish the installation.

3.05. SERVICE CONNECTIONS

- A. Air handling units and coils shall be equipped with required valves, vents, drain valves and safety devices and connected to piping systems and electrical services in a neat and workmanlike manner.

END OF SECTION

SECTION 26 05 00

GENERAL ELECTRICAL PROVISIONS

1. PART 1 GENERAL

1.1. SECTION INCLUDES

- 1.1.1 Basic requirements of a common or administrative nature that pertains to all electrical work.

1.2. RELATED SECTIONS

The requirements set out in the contract documents, contract forms, general conditions, supplementary general conditions and general requirements apply to all work specified herein.

1.3. WORK INCLUDED

- 1.3.1 The Contractor shall furnish all materials, labor, transportation, tools, permits, fees and incidentals necessary for the installation of a complete electrical system. 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 are required for work indicated or specified, it shall be the responsibility of the Contractor to provide all materials and equipment which are usually furnished with such systems in order to complete the installation, whether mentioned in the contract documents or not.

1.4. CODES AND STANDARDS

- 1.4.1. All work shall be in compliance with all applicable portions of the latest edition of the National Electrical Code (NEC), the National Electrical Safety Code (NESC), all city and county codes and ordinances, and other codes which may or may not be specifically referenced in these contract documents. None of the terms or provisions of these contract documents shall be construed as waiving any of the rules, regulations or requirements of these authorities.
- 1.4.2. In any instance where these contract documents call for construction materials of a better quality or larger size than required by the codes, the provisions of the contract documents shall take precedence. The codes shall govern in case violations are indicated in the construction documents.

1.5. DRAWINGS

- 1.5.1. The drawings are intended to show the general arrangement and the extent of the work. The exact location and arrangement of all parts shall be determined as the work progresses to conform in the best possible manner with the surroundings and as directed by the Owner's Representative.

- 1.5.2. If any departures from the drawings are deemed necessary by the Contractor, details of such departures and the reasons therefore shall be submitted to the Owner's Representative for review. No departures shall be made without prior written acceptance of the Owner's Representative.

1.6. SUBMITTALS

- 1.6.1. The Contractor shall furnish six copies of the manufacturer's literature and drawings describing all proposed equipment and materials indicated in the specifications. The front sheet or brochure shall have job name, architect, engineer, contractor and suppliers identified.
- 1.6.2. All sheets of the submittal shall have the job name stamped or permanently written on them, and shall be assembled in an indexed brochure. The descriptive materials shall be arranged in the brochure in the same order as found in the specifications. Each brochure shall be submitted in a three-ring binder. Binders shall be hardback unless the Engineer, at his discretion, allows heavy-paper-type binders on a smaller project. The leading sheet of the descriptive material for each item shall be full size of heavy paper, with a numbered outside tab. An index sheet showing the location in the brochure of all equipment and material submitted shall be placed in the front of the brochure. The index sheet shall be made to conform to the following example.

- INDEX -

Item No.	Specifications Paragraph No.	Specifications Page No.	Description
1.6.3.	Submittals shall include detailed specifications and construction data. Manufacturer's regular catalog sheets will not be acceptable unless they indicate completely all of the specification requirements. Where submittal sheets cover several sizes or types of equipment, they shall clearly indicate, by the use of a different color ink, the type or size to be used on the project and the use intended. Products submitted as substitutions shall be identified in the index as a substitution.		
1.6.4.	Approval of the submittals, or any part of the contents therein, shall not eliminate the responsibility for compliance with the drawings and specifications, nor shall it eliminate the requirements or the responsibility for freedom from errors of any sort in the data submitted.		

1.7. RECORD DRAWINGS

- 1.7.1. The Contractor shall maintain a set of electrical drawings at the job site neatly marked with all changes from the original contract drawings. This set of drawings shall not be used for construction purposes and shall be available to the Owner's Representative at all times. Drawings shall be kept up to date as the job progresses and shall be delivered to the Owner's Representative at the completion of the contract.
- 1.7.2. A fresh, clean set of drawings on which variations to the original construction documents are legibly recorded and designated "as-built" shall be furnished to the

Owner's Representative upon completion and acceptance of work and before final payment is made.

1.8. OPERATION AND MAINTENANCE MANUALS

- 1.8.1. The Contractor shall furnish six sets of operation and maintenance manuals to the Owner's Representative. These manuals shall include all items designated in the specifications, shall be assembled in an indexed three-ring binder as described in the paragraph titled "SUBMITTALS" and shall include all warranties. Separate equipment brochures will not be acceptable. A pictorial parts list, operation and maintenance instructions, system descriptions, schematic wiring diagrams and equipment cut sheets shall be included for each item with source information. NOTE: These manuals shall be delivered to the Owner's Representative prior to final acceptance of the installation by the Owner.
- 1.8.2. Final acceptance of the installation shall not occur until the Owner's personnel have been trained in the maintenance and operation of all equipment for a minimum of four hours.

1.9. SITE EXAMINATION

- 1.9.1 The Contractor shall be responsible for the coordination and proper relation of his work to the building structure and to the work of all trades. The Contractor shall visit the premises and thoroughly familiarize himself with all details of the work and working conditions, and verify all dimensions in the field. The Contractor shall advise the Owner's Representative of any discrepancy at least seven days 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.

1.10 UTILITIES

- 1.10.1 The contract documents reflect the general location, voltage, capacity, size 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 and to meet with the local utility companies in order to coordinate and confirm the exact requirements for all electrical utilities, including, but not limited to, all facilities required to provide complete and operative electrical power and telephone services. The bid submitted by the Contractor shall include costs for all such coordinative work as well as any and all utility company charges and/or fees.

1.11 TEMPORARY POWER

- 1.11.1 The Electrical Contractor shall provide the necessary wiring, connections, service switches, poles, wiring protective devices, lighting fixtures, lamps, outlet devices, disconnect switches, etc., as required for temporary lighting. In addition, a similar system shall be provided for the distribution of single- and three-phase power of voltage levels and adequate ampacity as required to facilitate the construction of the project. These services shall be installed in accordance with requirements of the NEC and OSHA.

1.11.2 The Electrical Contractor shall coordinate with the local utility company, the General Contractor and other trades involved to determine requirements for temporary power on this project. No additional charges shall be made to the Owner for wiring, connections, pole, fixtures or devices required to facilitate construction.

1.12 STORAGE AT SITE

Store major electrical equipment (switchboards, panelboards, lighting fixtures, dry type transformers, VFDs, etc.) sealed in original factory wrapping in a clean, dry and conditioned environment protected from the weather. Storage outdoors is not acceptable.

1.13 GUARANTEE

The Contractor shall guarantee all labor and materials furnished by him in accordance with state law or the general conditions of the contract, but in no case for a period of less than one year. Certain work and materials shall be guaranteed for a longer period when so specified. Guarantee period shall extend from the time of final acceptance of the installation. The Guarantee shall cover the repair or replacement, without additional cost to the Owner, of any defective material or faulty workmanship. All necessary service to each item and other work requiring specialized training shall be furnished by the Contractor, at no cost to the Owner, for a period of one year, concurrent with the warranty period specified above. The above items pertaining to routine servicing of the equipment and motors, replacing fuses or replacing lamps are the responsibility of the Owner unless a service agreement is made between the Contractor and the Owner.

2. PART 2 PRODUCTS

2.1. EQUIPMENT AND MATERIALS

2.1.1. All materials shall be new and of quality grade. All materials of a type for which the Underwriters' Laboratories, Inc. (UL) has established a standard shall be listed by UL and shall bear the UL label.

2.2. SUBSTITUTIONS

2.2.1. References in the specifications or on the drawings to any article, device, product, material, fixture, form or type of construction by naming more than one acceptable manufacturer shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition; however, the Contractor, in such cases, shall obtain written prior approval for substitution of unnamed manufacturers. Requests for substitution must be received in writing, in accordance with the contract documents, at least ten working days before bid date. The request shall include a detailed listing of all products and/or devices for which acceptance is being requested. Engineering specification sheets and/or construction details shall be included for comparative purposes. If the product is acceptable to the satisfaction of the Owner's Representative and the Engineer, an addendum item will be issued stating acceptability.

3. PART 3 EXECUTION

3.1 WORKMANSHIP AND COMPLETION OF INSTALLATION

- 3.1.1. All work shall be performed by competent mechanics, skilled in their trade, and shall be executed in a thorough and substantial manner.
- 3.1.2. The Contractor shall be held responsible for transportation of his materials to and on the job, and for their storage and protection until the final acceptance of the job.
- 3.1.3. The Contractor shall be held responsible for timely placing of all conduit and outlet boxes, cabinets and other wiring devices in the walls, ceilings, slabs, beams, etc., as construction progresses.
- 3.1.4. Contractor shall furnish all necessary scaffolding, tackle, tools and appurtenances of all kinds, and all labor required for the safe and expeditious execution of his contract.
- 3.1.5. All equipment shall be installed in a manner to permit access to parts requiring service. All electrical equipment shall be installed in such a manner as to allow removal for service without disassembly of other equipment, and shall have working clearances as required by NEC. Any large piece of apparatus which is to be installed in any space in the building, and which is too large to fit through finished openings, shall be placed before enclosing structure is completed. Following placement, such apparatus shall be completely protected from damage.
- 3.1.6. The Contractor shall, at all times, keep the premises free from accumulations of waste material and packaging debris. This debris shall be removed daily from the construction site.

3.2. CUTTING AND PATCHING

- 3.2.1. Where it becomes necessary to drill or cut through any floors, walls or ceilings to permit the installation of any work under this contract, such cutting shall be done under the supervision of the Owner's Representative by the Contractor. After the necessary work has been completed, the damage shall be repaired by the Contractor.
- 3.2.2. No joists, beams, girders or columns shall be cut by the Contractor without first obtaining written permission from the Owner's Representative.
- 3.2.3. All drilling for expansion bolts, hangers and other supports shall be done by the Contractor, subject to the approval of the Owner's Representative. Labor and materials required to replace or rebuild parts cut or injured shall be furnished at the Contractor's expense, subject to the satisfaction of the Owner's Representative.
- 3.2.4. All openings made in fire-rated walls, floors and ceilings shall be patched by the electrical contractor in a manner maintaining the original fire rating.

3.3. COORDINATION

- 3.3.1. The Contractor shall coordinate the work of the different trades so that interferences between piping, equipment, structural and architectural work shall be avoided.
- 3.3.2. The Contractor is responsible for ensuring that all conduit sleeves are timely installed and are sealed, flashed or caulked to the satisfaction of the Owner's Representative.

3.4. HVAC EQUIPMENT WIRING AND CONTROL

- 3.4.1 In general, the Mechanical Contractor shall provide the low-voltage (less than 120 volts) control wiring from the heating, ventilation and air conditioning equipment (HVAC) to the mechanical furnished device (T-STAT, temperature control system, etc.). The electrical drawings will indicate only branch circuit power supplies to serve the HVAC equipment.

3.5. IDENTIFICATION AND LABELING

- 3.5.1. The Contractor shall provide and install a presentation grade one-line diagram of the electrical system in a framed plexiglass enclosure near the service entrance switchgear at a location as directed by the Owner's Representative.
- 3.5.2. All equipment shall have the manufacturer's nameplate permanently affixed in an obvious location.
- 3.5.3. Branch circuit panelboards shall contain a typed index card identifying all circuits.
- 3.5.4. Major pieces of equipment shall be labeled, as required by the NEC and directed by Owner's Representative, with engraved nameplates constructed of laminated phenolic. Letters shall be condensed gothic, 1/4 inch high. Nameplates shall be at least 1/16 inch thick, 3 ply, white surfaces, black core. Labels shall include equipment name, voltage and phases.

Example: Panel L1
 277/480V, 3 ϕ

- 3.5.5. All junction boxes and pull boxes shall be labeled with a permanent felt tip marker, 1/4 inch wide, indicating the circuits contained within.

Example: L1 7, 9, 11

- 3.5.6. All device plates shall be labeled on the back of the plate, with a permanent felt tip marker, indicating the circuits contained within the device box.

3.6. MISCELLANEOUS

- 3.6.1. Each piece of floor-mounted equipment, such as switchboards, transformers, etc., shall be set on a concrete base. Bases shall not be less than 4 inches high and shall be pinned to the floor.
- 3.6.2. The Contractor shall furnish and install vibration isolation means for all equipment and materials furnished under this contract which may transmit perceptible noise or vibration, structure borne or air borne, to occupied areas.
- 3.6.3. All transformers and other equipment indicated shall be mounted on 1-inch-thick cork rib pads and/or rubber or steel spring isolator units properly sized, spaced and loaded, as specified herein, which in turn shall rest on a 4-inch minimum concrete base.

- 3.6.4. Electrical conduit shall be isolated from all dry type transformers and rotating or reciprocating machinery with a minimum of 12 inches of liquidtight flexible metal conduit.

END OF SECTION

SECTION 26 27 00

BASIC MATERIALS AND METHODS

1. PART 1 GENERAL

1.1. SECTION INCLUDES

- 1.1.1. Conduit
- 1.1.2. Junction, pull and device boxes
- 1.1.3. Conductors
- 1.1.4. Disconnect switches
- 1.1.5. Overcurrent devices
- 1.1.6. Wiring devices
- 1.1.7. Lighting and branch circuit panelboards
- 1.1.8. Grounding
- 1.1.9. Testing

1.2. RELATED SECTIONS

- 1.2.1. Section 260500 - GENERAL ELECTRICAL PROVISIONS

1.3. REFERENCES

- 1.4. National Electrical Manufacturers Association (NEMA).
- 1.5. Underwriters' Laboratories (UL).
- 1.6. American National Standards Institute (ANSI).
- 1.7. ANSI/NFPA 70-National Electrical Code (NEC).
- 1.8. Institute of Electrical and Electronics Engineers (IEEE).

1.9. SUBMITTALS

- 1.9.1. Submit under provisions of Section 260500.
- 1.9.2. Product Data: Provide manufacturer's literature and product data on all equipment listed in Paragraph 1.01.

2. PART 2 PRODUCTS

2.1. CONDUIT

- 2.1.1. Electrical metallic tubing (EMT) shall be galvanized on the outside and coated on the inside with a smooth hard finish of lacquer, varnish or enamel. EMT shall comply with Underwriters Laboratories (UL) Standard UL 797 and ANSI C80-3. EMT coupling and box connectors for EMT shall be of the steel compression gland type.
- 2.1.2. Rigid galvanized steel (RGS) conduit shall be hot-dipped, galvanized steel with zinc coating or corrosion-resistant lacquer on the inside. RGS shall comply with UL Standard UL 6 and ANSI C80-1. Fittings shall be threaded, water and concrete-tight.
- 2.1.3. Flexible metal conduit (FMC) shall be of hot-dipped, galvanized, interlocked, spirally wound steel strip and shall comply with ANSI/UL 1. Connectors shall be galvanized and shall be suitable for connection to the associated boxes and conduits.
- 2.1.4. Liquidtight flexible metal conduit (LTFMC) shall be similar to flexible metal conduit and shall also have an outer PVC jacket and shall comply with ANSI/UL 360. Connectors shall be equal to Appleton type "ST" connectors.
- 2.1.5. Plastic conduit for direct burial shall be rigid, heavywall, Schedule 40, polyvinyl chloride (PVC). All Schedule 40 PVC conduit shall meet the requirements of UL and shall be manufactured by Carlon or approved equal.
- 2.1.6. Plastic conduit for installation in concrete duct banks shall be thinwall conforming to NEMA Standard TC6 and shall be UL listed.
- 2.1.7. Minimum conduit size shall be 3/4 inch. Minimum conduit size for fire alarm system conduits shall be 1/2 inch.

2.2. JUNCTION, PULL AND DEVICE BOXES

- 2.2.1. Junction and pull boxes shall be of code galvanized steel. Boxes mounted vertically on a wall shall be provided with hinged covers and catchlocks. Boxes mounted horizontally in or on the ceiling shall be furnished with screw covers. All such boxes shall conform to NEC for size and gauge of material. Junction and pull boxes shall be provided as required even if not shown on the drawings.
- 2.2.2. Device boxes and general purpose junction boxes shall be one-piece galvanized pressed steel knockout type with similar cover, and not less than 4 inches square. No sectional boxes will be permitted, except at single-pole switch locations with only two conductors.
- 2.2.3. All gang boxes for devices shall be designed specifically for the number of devices indicated.

- 2.2.4. Boxes for exterior devices shall be cast iron, Crouse Hinds FD, or approved equal, with gasketed covers.

2.3. CONDUCTORS

- 2.3.1. Conductors shall be of soft-drawn annealed copper. Conductors shall conform to federal specifications for the type of wire designated, and shall have a conductivity of not less than 98 percent of that of pure copper.
- 2.3.2. Minimum conductor size for power and lighting circuits shall be No. 12 AWG, unless shown otherwise on the drawings. Minimum conductor size for control and signal circuits shall be No. 14 AWG, unless shown otherwise on the drawings.
- 2.3.3. All conductors No. 8 AWG and larger shall be stranded. All conductors No. 10 AWG and smaller shall be solid.
- 2.3.4. All conductors located in dry locations shall be type THHN/THWN unless specifically designated otherwise. All conductors located in outdoor or wet locations shall be type XHHW-2.
- 2.3.5. All branch circuit conductors used for wiring in high temperature locations (such as boiler controls, range hoods, heating equipment, etc.) shall be type RHH heat-resistant grade.
- 2.3.6. Conductors shall be color coded as follows:
 - 2.3.6.1. 277/480V, 3 phase, 4 wire.....Brown, Orange, Yellow and Gray
 - 2.3.6.2. 120/208V, 3 phase, 4 wire.....Black, Red, Blue and White
 - 2.3.6.3. Control circuits.....Other than above
- 2.3.7. For phase conductors larger than No. 4 AWG, or neutral conductors No. 4 AWG or larger, colored plastic tape may be used in lieu of continuously colored conductor insulation. Each conductor shall have at least three 1-inch bands (4-inch separation) at every termination and splice.
- 2.3.8. Wire connectors shall be as follows:
- 2.3.9. Connectors for No. 8 AWG and smaller (dry locations) shall be self-insulated spiral spring screw-on connector with resilient or unbreakable plastic insulating cap. No ceramic or brittle plastic shell connectors will be approved.
- 2.3.10. Connectors for No. 8 AWG and smaller (damp locations) shall be compression sleeve type.
- 2.3.11. Connectors for No. 6 AWG and larger wires (damp or dry locations) shall be compression sleeve type.

2.4. DISCONNECT SWITCHES

- 2.4.1. Provide enclosed, fusible or nonfusible switches as shown on the drawings.
- 2.4.2. Switches shall be horsepower rated and shall have quick-make and quick-break mechanisms and interlocked covers.
- 2.4.3. Disconnect switches shall be heavy duty type HD.
- 2.4.4. Switches shall be suitable for the voltage, number of phases and wires, and short circuit and load currents shown on the drawings.
- 2.4.5. Fusible disconnect switches shall have provisions for Class R fuses.
- 2.4.6. Enclosures shall be the NEMA type suitable for the environmental conditions where the switch is installed.
- 2.4.7. Enclosures shall be of code gauge steel (NEMA 1) or code gauge galvanized steel (NEMA 3R). Enclosures shall be treated with a rust-inhibiting phosphate and finished in gray baked enamel.
- 2.4.8. Disconnect switches shall be service entrance rated where required by the drawings or codes.

2.5. OVERCURRENT DEVICES

2.5.1. Fuses

- 2.5.1.1. All fuses, 600 volts and less, shall be Bussmann "Low-Peak" or approved equal, and shall meet the following:
- 2.5.1.2. All fuses shall be manufactured by the same manufacturer.
- 2.5.1.3. Fuses rated 1/10 to 600 amperes shall be UL Class R dual element current limiting. All dual-element fuses shall have separate overload and short-circuit elements, and shall be Bussmann type LPS-RK (600V), LPN-RK (250V) or approved equal.
- 2.5.1.4. Motor circuit fuses rated 601 to 6,000 amperes shall be UL Class L, time delay, and shall be Bussmann type KRP-C, or approved equal.

2.5.2. Circuit breakers

- 2.5.2.1. All circuit breakers shall be thermal magnetic, molded case, and shall have the following characteristics:
- 2.5.2.2. Quick-make, quick-break type.
- 2.5.2.3. "Bolt-on" type.
- 2.5.2.4. Fully rated for the available fault current as shown on the drawings. **Series ratings are unacceptable.**

- 2.5.3. Common trip type for all multipole breakers.
 - 2.5.4. Operating handle shall visually indicate ON, OFF or TRIPPED conditions.
 - 2.5.5. Indicate the ampacity and frame size on the breaker.
 - 2.5.6. When used for switching light circuits, shall be marked "SWD," indicating "switch duty rated."
 - 2.5.7. When required by equipment manufacturer, circuit breaker shall be "HACR" rated.
 - 2.5.8. Where enclosed circuit breaker disconnects are shown on the drawings, provide an enclosure suitable for the environmental conditions where the breaker is installed.
- 2.6. WIRING DEVICES
- 2.6.1.Receptacles
- 2.6.1.1. Receptacles shall be flush, 20 amperes, 125 volts, specification grade, three wire, self or automatic grounding, duplex, and shall be Hubbell No. 5362 or approved equal. Receptacles shall match color and material of existing receptacles.
 - 2.6.1.2. Ground fault receptacles shall be flush, 20 amperes, 125 volts, specification grade, three wire, grounding, duplex, and shall be Hubbell No. GF5362 or approved equal. Receptacles shall match color and material of existing receptacles.
 - 2.6.1.3. Special purpose outlets not covered by the specifications but noted on the drawings shall be of the amperage and voltage rating indicated. The outlets shall be specification grade of the same quality, manufacturer and finish as those specified above.
 - 2.6.1.4. Other approved wiring device manufactures are Byrant, P & S and Leviton.
- 2.7. Wall switches
- 2.7.1. All lighting circuits shall be supplied with 20-ampere, 120/277-volt specification grade quiet type switches. Switches shall match color and material of existing switches.
 - 2.7.2. Single-pole switches shall be Hubbell No. 1221-1 or approved equal.
 - 2.7.3. Three-way switches shall be Hubbell No. 1223-1 or approved equal.
 - 2.7.4. Single-pole key-operated switches shall meet all the requirements of the single-pole toggle switch. Single-pole key-operated switches shall be Hubbell No. 1221-L or approved equal.
 - 2.7.5. Mullion single-pole switches shall meet all the requirements of the single-pole toggle switch.

2.8. Device plates and covers

- 2.8.1. Device plates for indoor concealed wiring shall be match existing device plates unless otherwise shown on the drawings.
- 2.8.2. Device plates for indoor exposed wiring shall be stamped sheet metal steel.
- 2.8.3. Weatherproof receptacles shall have device-mounted snap covers, UL listed for wet locations.
- 2.8.4. Where shown on the drawings, outdoor weatherproof covers shall be raintight NEMA 3R rated and shall meet NEC and OSHA requirements for "While in Use" applications.
- 2.8.5. Device plates for mullion switches shall match the mullion as nearly as possible.
- 2.8.6. Device plates shall be manufactured by Hubbell, Byrant, P & S or Leviton.

2.9. LIGHTING AND BRANCH CIRCUIT PANELBOARDS

- 2.9.1. Panelboards shall have the voltage, number of phases and wires, and current ratings as shown on the drawings.
- 2.9.2. Panelboards shall be circuit breaker panelboards conforming to the requirements of UL 67, UL 50, NEMA No. PB1 and the NEC. Each panelboard shall be mounted in a galvanized sheet-metal cabinet with a removable front panel complete with hinged door, latch and lock. All locks shall be keyed the same and two keys shall be provided for each lock. Cabinets shall have means for securing, supporting and adjusting panelboard front. There shall be no sharp points or edges inside cabinets.
- 2.9.3. Bus bars shall be copper. Bus bar taps shall be arranged for sequence phasing of the branch circuit devices. Neutral bars, where specified, shall be full size, insulated from the cabinet and mounted at the opposite end of the panel from the mains. A bare, uninsulated grounding bar, brazed to the cabinet, shall be provided where indicated. Bus bars for the mains shall have pressure-type lug connections for attaching feeders unless a main protective device is indicated. Where paralleled conductors feed the panel, lugs shall be provided for each conductor. Where spaces are indicated, the bus shall have all applicable accessories provided to enable a breaker to be readily installed.
- 2.9.4. Branch circuit breakers shall be as specified in Paragraph 2.05 (B).
- 2.9.5. A directory frame and card having a transparent cover shall be furnished on each door, neatly typed to indicate loads.
- 2.9.6. Panelboards shall be Square D, Cutler Hammer, Siemens or General Electric.

2.10. GROUNDING

- 2.10.1. Grounding conductors shall be copper, stranded, soft drawn or soft annealed.

- 2.10.2. Ground clamps for connecting grounding electrode conductors to copper, brass or lead pipes shall be made of copper, and if pipes are of steel or iron, the ground clamps shall be made of galvanized iron. These clamps shall be designed to provide permanent and positive pressure and to avoid mechanical injury to the pipes.
- 2.10.3. Grounding conductors and jumpers shall be connected to each other and to items to be grounded by means of pressure connectors, clamps and/or other suitable methods approved by the Engineer.
- 2.10.4. All grounding conductor connections made below grade shall be made using an exothermic welded connection. All below-grade connections shall be "Cadweld," "Thermoweld" or approved equal.
- 2.10.5. Ground rods shall be a minimum of 5/8-inch diameter by 8 feet long, copper-clad steel-core.
- 2.10.6. All concrete-encased or direct-buried underground electrode conductors shall be of stranded copper.
- 2.10.7. All equipment grounding conductors installed in conduits shall be insulated.

3. PART 3 EXECUTION

3.1. GENERAL

- 3.1.1. The Contractor shall study all construction documents and shall carefully lay out all work in advance of fabrication and erection in order to meet requirements of limited spaces. Where conflicts occur, the Contractor shall meet with all involved trades and resolve the conflict prior to erection of any work in the area involved.

3.2. CONDUIT

- 3.2.1. Above-grade conduit
- 3.2.2. Conduits located indoors and not subject to physical damage shall be electrical metallic tubing (EMT).
- 3.2.3. Conduits located outdoors, or subject to physical damage, shall be rigid galvanized steel (RGS).
- 3.2.4. Flexible metallic conduit (FMC) shall be used in dry locations and liquid tight flexible metal conduit (LTFMC) shall be used in wet locations to extend conduit connections to motors, lighting fixtures, transformers, etc. The length of flexible conduit shall not exceed 24 inches. The length shall not exceed 72 inches for recessed lighting fixtures only.
- 3.2.5. Where to Conceal: Conduits shall be concealed in all finished parts of the building. Conduits shall be concealed in pipe chases, walls, furred spaces, topping or above ceilings unless otherwise shown. All conduits shall be routed parallel or perpendicular to the building lines. No diagonal runs will be permitted.

- 3.2.6. Where to Expose: Conduits may be exposed in mechanical/electrical rooms, duct and piping chases, under-floor crawl spaces, and locations shown on the drawings. All exposed conduit shall be run in the neatest, most inconspicuous manner, and parallel or perpendicular to the building lines. No exposed diagonal runs will be permitted. The Contractor shall run all conduit in a manner satisfactory to the Owner's Representative.
- 3.2.7. Conduits shall be securely supported to building structure at intervals of not more than 8 feet. Conduits shall be fastened in place with galvanized steel clamps or pipe straps, hangers, 3/8-inch-diameter-minimum rods or trapeze. No perforated steel tape is permitted. Supports of structural steel or manufactured framing members shall be provided with all necessary rods, anchors, clamps, spacers and bolts. Conduits above removable ceiling panels shall allow sufficient clearance for panel removal or insertion. Conduits of any size shall not be supported from ceiling hangers or light fixture hangers. Conduit shall not be supported from piping or mechanical equipment unless specifically shown on plans. Allow 7 feet of headroom clearance.
- 3.2.8. Fasteners for conduit supports shall be self-drilling self-tapping screws in metal; wood screws in wood; or threaded expansion anchors or inserts in masonry or concrete. Wooden, plastic or lead inserts, or power-actuated anchors, will not be acceptable.
- 3.2.9. Rigid galvanized steel conduit shall be made up to boxes and equipment with double locknuts and shall have insulated bushings installed. Grounding continuity shall be maintained.
- 3.2.10. All roof penetrations shall be properly sleeved, sealed and flashed for complete waterproofing. In lieu of the above, approved factory-fabricated watertight entrance glands shall be used.
- 3.2.11. In no case shall a raceway be run within 6 inches of steam or hot water pipes, breechings, flues or other high-temperature surfaces.
- 3.2.12. Provide sleeves in new concrete or masonry walls for passage of conduits. Waterproof all sleeves where required.

3.3. Below-grade conduit

- 3.3.1. Nonencased, direct-buried conduits in or below slabs-on-grade, in earth, or in gravel shall be rigid, Schedule 40, polyvinyl chloride (PVC).
- 3.3.2. Conduit encased in concrete shall be PVC thinwall.
- 3.3.3. All offsets and ells shall be rigid galvanized steel, wrapped with tape as specified below.
- 3.3.4. All conduit risers shall be rigid galvanized steel.
- 3.3.5. All underground conduits shall be installed a minimum of 24 inches below grade unless shown otherwise on the drawings.

- 3.3.6. Metal conduits and fittings buried underground shall be carefully wrapped with half-lapped 3M No. 51 "Scotchrap," or approved equal, vinyl tape, with wrapping extending at least 3 inches beyond the edge of any exposed metal.
- 3.3.7. Where conduits are installed in slabs, conduits shall be set in position as soon as the forms are in place and in such manner as not to impair the strength of the slab. For exact locations, see architectural sections and locate as directed by Owner's Representative with respect to the reinforcing steel.
- 3.3.8. Where concrete encasement is shown on the drawings, provide a minimum of 3 inches concrete envelope above, below and at sides of ductbank. Provide 2 inches of concrete between conduits. Concrete shall be 2,500 psi class concrete. For multiple rows of conduit, provide plastic spacers on maximum 10-foot centers to maintain horizontal and vertical spacing of conduits.

3.4. General

- 3.4.1. To prevent the accumulation of water, dirt or concrete in conduit during work, conduit ends shall be sealed by use of metallic "pennies" or resilient plastic sealing caps during construction until wire is pulled. Properly cap spare and empty conduit systems, stubbed up from below grade or from below floor level, with permanent caps.
- 3.4.2. Horizontal runs of conduit shall be installed to provide a natural drain for condensation without pockets or traps where moisture may collect. All conduits shall be blown out and swabbed out before pulling in wire.
- 3.4.3. Furnish and install a polypropylene pull cord in every empty raceway. Identify each end of pull wire with tags with complete information as to location of the other end of the wire.
- 3.4.4. Provide expansion couplings where conduits cross expansion joints, and where required by the NEC.

3.5. JUNCTION, PULL AND DEVICE BOXES

- 3.5.1. Provide a standard access panel having a hinged metal door neatly fitted into a flush metal trim, where a junction box is located above hard ceilings or in finished walls. Coordinate the location and type with the Owner's Representative.
- 3.5.2. Verify final location of all boxes with Owner's Representative prior to rough-in.
- 3.5.3. Where more than one switch or device is located at the same location, multi-gang boxes and covers shall be provided.
- 3.5.4. Back-to-back device boxes in a wall are not permitted. Provide a minimum 12-inch-long nipple to offset boxes on opposite sides of a common wall to minimize sound transmission.

3.5.5. Provide proper throats and extension rings to ensure that device boxes are within 1/4 inch of finished wall surfaces.

3.5.6. Identify all circuits located in junction, pull and device boxes per Section 260500.

3.6. CONDUCTORS

3.6.1. All conductors shall be installed in conduit unless noted or specified otherwise.

3.6.2. Maximum branch circuit homerun lengths shall be as follows:

CIRCUIT TYPE	No. 12 AWG	No. 10 AWG	No. 8 AWG	No. 6 AWG
Multiple 120V receptacle or lighting homerun	50 feet	100 feet	150 feet	225 feet
Dedicated 120V receptacle homerun	75 feet	150 feet	225 feet	350 feet
Multiple 277V lighting homerun	100 feet	200 feet	300 feet	500 feet

3.6.3. A UL-approved cable pulling compound shall be used as a lubricant where necessary. No materials which may be injurious to the wire covering or insulation shall be used.

3.6.4. Conductors pulled into a wrong raceway or cut too short for termination shall be replaced. Conductors shall not be reinstalled after removal from a raceway.

3.6.5. Mains and feeders shall run their entire length in continuous pieces without joints or splices unless otherwise shown.

3.6.6. Joints in branch circuits shall occur only where such circuits divide as shown on the plans. No splices shall be made in submersible locations.

3.6.7. Splices and taps shall not be made in any conductor except at outlet boxes, pull boxes or junction boxes. Splices shall not be made in conduit bodies.

3.6.8. All electrical conductor terminations shall be torque wrench or torque screwdriver tightened per UL and NEMA standards.

3.6.9. Where the bodies of fluorescent lighting fixtures are used as raceways for lighting branch circuits, conductors shall be securely clamped within the fixture body to positively prevent contact of the wires with the ballast case.

3.6.10. Wire connectors located in damp locations shall be wrapped with rubber and vinyl tape equal to Scotch No. 130 and Scotch No. 33 tape, followed by a coating of ScotchKote, or approved equal.

3.7. DISCONNECT SWITCHES

3.7.1. Install disconnect switches to maintain NEC clearances.

- 3.7.2. Install label inside each fused disconnect switch indicating the fuse type and ampere rating.
- 3.8. OVERCURRENT DEVICES
 - 3.8.1. Verify proper fuse or circuit breaker size prior to installing.
 - 3.8.2. Where circuit breakers are installed in existing panelboards, verify that breaker type and AIC ratings match the existing circuit breakers installed in the panel.
- 3.9. WIRING DEVICES
 - 3.9.1. All mounting heights shown below are to centerline of devices.
 - 3.9.2. Receptacles shall be installed 18 inches above finished floor unless otherwise shown.
 - 3.9.3. Receptacles above counters shall be horizontally mounted at 42 inches above finished floor unless otherwise shown.
 - 3.9.4. Receptacles shall generally be mounted vertically in box, set plumb and true with the ground pin receiver in the top position.
 - 3.9.5. Switches shall be flush mounted 48 inches above finished floor unless otherwise noted.
 - 3.9.6. Switches shall be mounted vertically, set plumb and true, so that toggle handle is "up" in the "ON" condition.
 - 3.9.7. Switches that are indicated as adjacent to each other on the drawings shall be installed in a common junction box. Provide box dividers for 277-volt circuits and one-piece wall plate, ganged as required. Sectionalized device plates will not be accepted.
 - 3.9.8. All devices installed shall be installed with 6-inch pigtails.
 - 3.9.9. All devices shall be compatible with architectural room finishes. All devices shall be trimmed out as scheduled to the satisfaction of the Owner's Representative.
- 3.10. LIGHTING AND BRANCH CIRCUIT PANELBOARDS
 - 3.10.1. Cabinets shall be set rigidly in place with fronts straight and plumb.
 - 3.10.2. Provide type-written circuit identification card placed in door-mounted directory frame.
 - 3.10.3. Install panelboards in areas where NEC clearances can be maintained.
 - 3.10.4. Provide panelboard nameplates in accordance with Section 260500.

3.10.5. Panelboard mounting height shall be 6 feet to the top of trim.

3.11. GROUNDING

3.11.1. The electrical system shall be grounded in accordance with Article 250 of the NEC. All electrical equipment including conduit systems, boxes, disconnect switches, receptacles, panelboards, motors, etc. shall be grounded.

3.11.2. The service entrance groundbus shall be bonded to the building water service, building steel, ufer ground and ground rods with conductors sized per NEC Table 250-94.

3.11.3. Resistance between any point on the grounding electrode system and any object in the vicinity, including earth and floors, shall not exceed 25 ohms. Ground resistance measurements of all ground rods shall be made in normally dry weather, not less than 24 hours after rainfall. The Contractor shall submit measured ground resistance readings to the Engineer.

3.11.4. If the ground resistance exceeds 25 ohms, additional ground rods shall be installed to lower the ground resistance to below 25 ohms.

3.11.5. The ground terminal on all convenience receptacles shall be bonded to the box and to the branch circuit grounding conductor with a bonding jumper to provide good continuity back to the source.

3.11.6. Conduits which connect to boxes, cabinets or enclosures having concentric or eccentric knockouts shall be provided with bonding jumpers sized in accordance with NEC Table 250-95 connected between a grounding type bushing/locknut on the conduit and a groundbus or stud inside the enclosure.

3.11.7. Where grounding connections are made to conduits, cabinets, etc., metal surface contacts shall be cleaned so that there is a good ground connection.

3.11.8. All raceways shall contain a green insulated equipment grounding conductor sized per NEC 250-95, even if not shown on the drawings.

3.12. TESTING

3.12.1. All tests shall be satisfactorily completed and accepted before final inspection or acceptance. Provide test reports for all tests. Test reports shall be bound with O & M manuals.

3.12.2. Insulation of feeder conductors shall be tested with a 1,000-volt megger. Test each feeder conductor for a minimum acceptable ground resistance reading of 100 MEG ohms. Replace feeder conductors which do not meet the minimum reading or which differ appreciably from other feeder ground resistance readings.

3.12.3. Panelboard busbars shall be meggered prior to energizing to ensure that shorts or grounds do no exist.

3.12.4. Measure and record ground resistances in accordance with Paragraph 3.09.

3.12.5. Test each receptacle for proper phase, neutral and ground connections.

END OF SECTION

SECTION 26 41 00
FACILITY LIGHTNING PROTECTION

1. PART 1 GENERAL

1.1 DESCRIPTION

- 1.1.1 This section specifies the furnishing and installation of a complete master labeled lightning protection system, complying with NFPA 780, UL 96 and UL 96A.

1.2 RELATED WORK

- 1.2.1. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements that are common to more than one section of Division 26.B.

1.3 SUBMITTALS

- 1.3.1 In accordance with Section 26 05 00, GENERAL ELECTRICAL PROVISIONS, submit the following:

1.3.2 Shop Drawings:

- 1.3.2.1 Isometric and plan views showing layout and connections to the required metal surfaces.

- 1.3.2.2 Show the methods of mounting the system to the adjacent construction.

- 1.3.3 Qualifications: Submit proof that the installer of the lightning protection system has had suitable and adequate experience installing other lightning protection systems, and is capable of installing the system as recommended by the manufacturer of the equipment.

- 1.3.4 Certification: Two weeks prior to final inspection, submit four copies of the following certifications to the Resident Engineer:

- 1.3.4.1 Certification that the lightning protection system has been properly installed and tested.

- 1.3.4.2 Certification that the lightning protection system has been inspected by a UL representative and has been approved by UL without variation.

1.4 APPLICABLE PUBLICATIONS

1.4.1 Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

1.4.2 National Fire Protection Association (NFPA):
70-08 National Electrical Code (NEC)
780-08 Standard for the Installation of Lightning Protection Systems

1.4.3 Underwriters Laboratories, Inc. (UL):
96-94 Lightning Protection Components
96A-01 Installation Requirements for Lightning Protection Systems

2. PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Attach master labels "A" or "B" to each item by its manufacturer as evidence that the materials have been manufactured in conformance with the UL Standards for master label lightning protection materials.

2.1.2 In addition to conformance to UL 96, the component material requirements are as follows:

2.1.2.1 Conductors: Electrical grade copper.

2.1.2.2 Air terminals: Solid copper, not less than 9 mm (3/8 inch) diameter, with sharp nickel-plated points.

2.1.2.3 Ground rods: Copper clad steel, not less than 13 mm (1/2 inch) diameter by 2400 mm (8 feet) long.

2.1.2.4 Ground plates: Solid copper, not less than 2 mm (1/16 inch) thick.

2.1.2.5 Tubing: Stiff copper or brass.

2.1.3 Anchors and fasteners: Bolt type which are most suitable for the specific anchor and fastener installations.

3. PART 3 - EXECUTION

3.1 INSTALLATION

- 3.1.1 Install the conductors as inconspicuously as practical and with the proper bends.
- 3.1.2 Install the vertical conductors within the concealed cavity of exterior walls. Run the conductors to the exterior at elevations below the finished grade and make the ground connections to the earth outside of the building or stack perimeter.
- 3.1.3 Make connections of dissimilar metal with bimetallic type fittings to prevent electrolytic action.
- 3.1.4 Use the exothermic welding type connections that form solid metal joints in the main vertical and horizontal conductors, and for connections that are not exposed in the finish work.
- 3.1.5 Protect copper conductors with stiff copper or brass tubing, which enclose the conductors from the top to the bottom of the tubing, between 300 mm (one foot) below and 2100 mm (seven feet) above the finished grade.
- 3.1.6 Sheath copper conductors, which pass over cast stone, cut stone, architectural concrete and masonry surfaces, with not less than a 2 mm (1/16 inch) thickness of lead to prevent staining of the exterior finish surfaces.
- 3.1.7 For the earth connections, install ground rods and ground plates, and the conductor connections to them and the main water pipes in the presence of the Resident Engineer. For the conductors located outside of the building or stack, install the conductors not less than 600 mm (two feet) below the finished grade.
- 3.1.8 For structural steel buildings, connect the steel framework of the buildings to the main water pipe near the water system entrance to the building.
- 3.1.9 Connect exterior metal surfaces, located within 900 mm (three feet) of the lightning protection system conductors, to the lightning protection system conductors to prevent flashovers.
- 3.1.10 Where shown, use the structural steel framework or reinforcing steel as the main conductor:

- 3.1.10.1 Weld or bond the non-electrically-continuous sections together and make them electrically continuous.
 - 3.1.10.2 Verify the electrical continuity by measuring the ground resistances to earth at the ground level, at the top of the building or stack, and at intermediate points with a sensitive ohmmeter. Compare the resistance readings.
 - 3.1.10.3 Connect the air terminals together with an exterior conductor connected to the structural steel framework at not more than 18000 mm (60 foot) intervals.
 - 3.1.10.4 Install ground connections to earth at not more than 18000 mm (60 foot) intervals around the perimeter of the building.
 - 3.1.10.5 Weld or braze bonding plates, not less than 200 mm (eight inches) square, to cleaned sections of the steel and connect the conductors to the plates.
 - 3.1.10.6 Do not pierce the structural steel in any manner. Connections to the structural steel shall conform to UL Publication No. 96A.
- 3.1.11 When the lightning protection systems have been installed, have the systems inspected by a UL representative. Obtain and install a UL numbered master label "C" for each of the lightning protection systems at the location directed by the UL representative and the Owner.
- 3.1.12 Where the drawings show the new lightning protection system connected to an existing lightning protection system without a UL master label, the new portion of the lightning system still requires inspection and labels as specified above for new work.

END OF SECTION

SECTION 27 05 00
TELECOMMUNICATIONS SYSTEMS

1. PART 1 GENERAL

1.1 SCOPE

- 1.1.1. This section generally describes the work and equipment required to furnish and install a complete commercial telecommunications cabling and pathway system with service entrance facilities, equipment rooms, telecommunications closets, backbone cable and pathways, cross-connect fields, patch panels, horizontal cabling and pathways, workstation faceplates, and testing. All active telephone or data network equipment shall be furnished and installed by the Owner, outside of this contract.

1.2. Related Work Specified Elsewhere

- 1.2.1. The requirements of Section 260500, General Requirements for Electrical Work, govern the work specified in this section, where applicable.
- 1.2.2. The requirements of Section 262700, Basic Materials also apply to this section.

1.3. Extent of work as required by the drawings.

1.3.1. REFERENCE STANDARDS

- 1.3.2. NFPA 70, National Electrical Code (NEC), latest approved edition of local jurisdiction.
- 1.3.3. ANSI/TIA/EIA-568-B, Commercial Building Telecommunication Cabling Standard.
- 1.3.4. ANSI/TIA/EIA-569, Commercial Building Standard for Telecommunications Pathways and Spaces.
- 1.3.5. ANSI/TIA/EIA-606, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
- 1.3.6. ANSI/TIA/EIA-607, Commercial Building Grounding and Bonding Requirements for Telecommunications.
- 1.3.7. TIA/EIA TSB-67, Performance Specifications for Field Testing of Unshielded Twisted-Pair Cabling Systems.
- 1.3.8. Telephone company standards.

1.4. QUALIFICATIONS

- 1.4.1. The telecommunications systems installer shall be a company regularly engaged in furnishing and installing telecommunications cabling systems, and shall have completed a minimum of five projects of similar design and complexity within the last two years. Pathways may be installed by nonspecialized electricians, but shall be under the direction of the telecommunications system installer.

- 1.4.2. The telecommunications systems installer shall employ a BICSI-certified Registered Communications Distribution Designer (RCDD), who shall supervise all phases of planning, documenting, installing and testing of the telecommunications system. The installer shall also provide a jobsite foreman with BICSI certification as a Cabling Installation Technician.

1.5. SUBMITTALS

- 1.5.1. Submit shop drawings according to requirements of Section 260500, General Requirements for Electrical Work.
- 1.5.2. Submit statement of qualifications, listing project references to verify required experience, and proof of RCDD and cable installer certifications.
- 1.5.3. Submit complete shop drawings showing layout of telecommunications spaces and pathways in plan view at no less than 1/8-inch scale. Submit scaled elevation sketches showing the arrangement of pathways, hardware and cable management in telecommunications spaces. Submit schematic diagram of cabling installation. Indicate labeling scheme for spaces, pathways, cables and connection hardware. Submit proposed testing procedures and sample testing report format.
- 1.5.4. Submit product data on all pathway components, cable types, and termination and cross-connect hardware.
- 1.5.5. Review provisions in the building design for the telecommunications infrastructure, and submit an itemized list of any building features which will keep the installation from being fully ANSI/TIA/EIA standards compliant.
- 1.5.6. Submit complete test data following acceptance testing of completed cabling links. Furnish test results in printed bound volume, and in electronic format capable of being imported into standard commercial spreadsheet and database management software.

2. PART 2 PRODUCTS

2.1 PATHWAYS

- 2.1.1 Interior conduits shall be rigid galvanized steel (RGS) or electric metallic tubing (EMT) meeting all requirements of Section 262700, Basic Materials. Minimum conduit size shall be 3/4 inch.
- 2.1.2 J-hooks shall be designed specifically to support telecommunications cabling of the type used in this project.
- 2.1.3 Outlet boxes shall be minimum 4-11/16" square x 2-1/8" deep with single or two-gang plaster ring as required.

2.2 CABLES

- 2.2.1 Horizontal cable shall be four-pair, 24 AWG, 100-Ohm, Category 6 UTP. Provide plenum rated sheath where cable is routed exposed through air return plenums.

2.3 CONNECTING HARDWARE

- 2.3.1 Telecommunications outlet faceplates shall be rated as Category 6, and shall contain the indicated quantity of eight-pin modular jacks. Faceplates shall be of same material and finish as specified for electrical device coverplates under Section 260500, Basic Materials.
- 2.3.2 Combination voice/data locations shall have a four-position faceplate with three jacks installed, and one position left unopened and suitable for installation of either eight-pin modular jack or SC type fiber optic connector. The top (or left) jack shall be labeled "voice." The middle two jacks shall be labeled "data." The bottom (or right) position shall be labeled "spare."
- 2.3.3 Voice only locations shall have a one-position faceplate with a single eight-pin modular jack. Faceplates for wall-mounted instruments shall have instrument mounting studs.
- 2.3.4 Data only locations shall have a four-position faceplate with two jacks installed, and two positions left unopened and suitable for installation of either eight-pin modular jack or SC type fiber optic connector. The top (or left) position shall be labeled "spare." The middle two jacks shall be labeled "data." The bottom (or right) position shall be labeled "spare."
- 2.3.5 Patch panels shall be rated as Category 6, and shall consist of eight-position modular jacks with rear-mounted type 110 insulation displacement connectors, arranged in rows on 19-inch rack-mounted panels. Provide cable management modules as required. Provide quantity of 19-inch open frame equipment racks as specified, or as otherwise required to house patch panels and cable management hardware without consuming more than 50 percent of available mounting space on any one rack.
- 2.3.6 Patch cords shall be Category 6 cable assemblies with factory-assembled eight-pin plugs on each end.
- 2.3.7 Terminal blocks shall be Category 6, wall mounted type 110 wire termination units consisting of insulation displacement connectors mounted in plastic blocks, frames or housings. Blocks shall contain cable management hardware.
- 2.3.8 Equipment mounting backboards shall be 4' x 8' x 3/4" AC plywood, painted all sides with two coats of fire-retardant white paint, and mounted to the wall in the vertical orientation.

3. PART 3 EXECUTION

3.1 TELECOMMUNICATIONS SPACES

- 3.1.1 Provide service entrance rooms, equipment rooms and telecommunications closets as indicated on the plans. Layout of pathways, cross-connect fields, equipment racks, grounding busbars and power receptacles on the plans are diagrammatic in nature. The telecommunications system installer shall arrange the spaces to comply with TIA/EIA standards and requirements of the project. Reserve any spaces identified on the plans for Owner's active equipment, or coordinate with Owner prior to rearranging layout.

3.2 PATHWAYS

- 3.2.1 Provide continuous metallic conduit to enclose horizontal cable from the telecommunications closet to the outlet backbox. Where cable tray is used, metallic conduit shall be provided from the cable tray to the outlet backbox. The conduit shall be securely clamped to the cable tray with a grounding clamp, or a grounding jumper shall be installed between the conduit and the cable tray.
- 3.2.2 Provide conduit fitting with insulated throat at each conduit end.
- 3.2.3 The use of J-hooks will only be permitted where specifically called for on the plans. J-hook intervals shall not exceed 5 feet. No cable shall be permitted to rest on structural elements, ceiling grids or other building components.
- 3.2.4 Provide pull cord in each conduit, whether containing cables or spare.
- 3.3 CABLES
 - 3.3.1 Install all cables per ANSI/TIA/EIA-568-B, and manufacturer's installation and termination instructions. Provide cable management hardware and riser supports as required. Do not exceed allowable pulling tension.
- 3.4 CONNECTION HARDWARE
 - 3.4.1 Terminate all installed cable pairs. Provide type 110 terminal blocks for voice, mounted to plywood backboard. Provide rack-mounted patch panels for data.
- 3.5 ADMINISTRATION
 - 3.5.1 Provide component identification and labeling scheme in compliance with ANSI/TIA/EIA 606. Label each cable and pathway end. Provide color coding of termination and cross-connect fields.
- 3.6 TESTING
 - 3.6.1 Provide testing of each installed cable link per ANSI/TIA/EIA-568-B, and TIA/EIA-67.

END OF SECTION

SECTION 31 00 00

EARTHWORK

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1. Removal, stockpile and placement of topsoil and subsoil.
- 1.1.2. Excavation, including as required for foundations, slabs-on-grade, paving, and landscaping.
- 1.1.3. Fill and backfilling to required elevations.
- 1.1.4. Consolidation and compaction.
- 1.1.5. Site Contouring.

1.2. REFERENCES

- 1.2.1. Geotechnical Report: As identified in *Document 00220*.
- 1.2.2. Standard Specifications for Public Works Construction (SSPWC) ("Green Book") // *State of California, Department of Transportation (CalTrans), Standard Specifications* //, latest edition as adopted by serving jurisdictional authority.
- 1.2.3. ASTM C136 - Method for Sieve Analysis of Fine and Course Aggregates.
- 1.2.4. ASTM D1556 - Test Method for Density of Soil in Place by the Sand - Cone Method.
- 1.2.5. ASTM D1557 - Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³).
- 1.2.6. ASTM D 2922 - Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- 1.2.7. ASTM D 3017 - Moisture Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

1.3. QUALITY ASSURANCE:

- 1.3.1. Contractor Qualifications
 - 1.3.1.1. Installing Company: Company specializing in grading and excavation work, with minimum 5 years documented experience in projects of similar scale and scope.
 - 1.3.1.2. Installing Foreman: Individual specializing in grading and excavation work, with minimum 5 years documented experience in projects of similar scale and scope.

1.4. PROJECT RECORD DOCUMENTS

- 1.4.1. Submit documents under provisions of Section 01 77 19.

- 1.4.2.** Accurately record location of utilities remaining, rerouted utilities, new utilities by horizontal dimensions, elevations or inverts, and slope gradients.

1.5. PROTECTION

- 1.5.1.** Protect trees, shrubs, lawns, rock outcropping, and other features remaining as portion of final landscaping.
- 1.5.2.** Protect benchmarks, existing structures, fences, roads, sidewalks, paving and curbs.
- 1.5.3.** Protect above or below grade utilities, which are to remain.

1.6. PUBLIC AGENCY STANDARDS

- 1.6.1.** Perform all earthwork and related structures and devices indicated as public agency standards in accordance with the standard plans and specifications of that agency.
- 1.6.2.** Where earthwork is constructed in public streets or rights of way, construct in accordance with the standard plans and specifications of the authority having jurisdictions and in the presence of a representative of that agency.
- 1.6.3.** Secure and pay for all necessary permits for work performed under conditions which exist in 1.6.2 above. The Owner will pay for associated inspection fees.
- 1.6.4.** Upon completion of the work, provide the Architect with written certification of acceptance of work by the governing agency having jurisdiction.

2. PART 2 - PRODUCTS

2.1. STRUCTURAL FILL MATERIAL

2.1.1. On-Site Fill Materials:

- 2.1.1.1.** On site, granular, low-expansive fill material free of vegetation, organic material, debris and other deleterious material, and complying with the following criteria.

- 2.1.1.1.1.** On site material that does not comply with Article 2.1 shall not be used as structural fill material.

2.1.1.2. Grading:

- 2.1.1.2.1.** Limit maximum dimension of rock to 3 inches in any dimension at all fills, unless otherwise approved by Geotechnical Engineer.

- 2.1.1.2.2.** Limit maximum dimension of rock to 1 inch in any dimension at all fills located in landscaped areas within 12 inches of surface.

- 2.1.1.2.3.** Provide soil fill with no more than 30 percent passing the #200 sieve.

- 2.1.1.2.4.** Provide soil fill with minimum 40 percent by weight material smaller than 3/4 inch.

- 2.1.1.3. Expansion Index: Classified as "Very Low", with a maximum value of 20 per ASTM D 4829 and in accordance with Section 1802A.3.2, Part 2, Title 24, CCR.
- 2.1.1.4. Hazardous Materials: Provide certification based on test data that soil materials pass Phase 1 and Phase 2 testing per ASTM E 1527 and all additional federal, state or local regulations, including California DTSC regulations.
- 2.1.1.5. Obtain approval of Geotechnical Engineer of all fill materials prior to placing.
- 2.1.2. Import Soils
 - 2.1.2.1. Comply with criteria specified in 2.1.1 above, and the following additional requirements.
 - 2.1.2.2. Expansion Index: Classified as "Very Low", with a maximum value of 20 per ASTM D 4829 and in accordance with Section 1802A.3.2, Part 2, Title 24, CCR.
 - 2.1.2.3. Sulphate Content: Limit to maximum 1,000 PPM and as approved by Geotechnical Engineer.
 - 2.1.2.4. Electrical Resistivity: Minimum value in excess of 2,000 ohm cm when saturated with distilled water, in accordance with California Test Method 643 or soil resistivity box procedure per ASTM G 57.
 - 2.1.2.5. Agricultural Suitability: Obtain approval of Architect of all fill materials used in landscaped areas prior to placing, including providing soil test/analysis results.
 - 2.1.2.6. Use of clay or adobe soil is not acceptable.
 - 2.1.2.7. Obtain approval of Geotechnical Engineer of all imported fill materials prior to delivery on site.
- 2.1.3. Topsoil: Defined as the upper 4 inches of on-site material, after completion of clearing operations specified in Section 31 11 00.
- 2.1.4. Concrete: Lean concrete, with a compressive strength of 1000 psi.
- 2.2. PERMEABLE FILL MATERIAL
 - 2.2.1. Permeable Backfill at Retaining Walls:
 - 2.2.1.1. Characteristics: Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, or organic matter.
 - 2.2.1.2. Graded within the following limits:

SIEVE SIZE	PERCENT PASSING
1 inch	100
3/4 inch	90 to 100
3/8 inch	40 to 100
No. 4	25 to 40
No. 8	18 to 33
No. 30	5 to 15
No. 50	0 to 7
No. 200	0 to 3

2.2.1.3. Provide material with sand equivalent exceeding 75.

2.3. DESIGN CRITERIA

2.3.1. General

2.3.1.1. All public improvements shall be constructed per the referenced standards, the improvement drawings, and as specified in this section.

2.3.1.2. Where criteria shown on drawings or specified in this specification exceed that of the referenced standards, the more stringent criteria shall apply.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.2.1. Verify that survey benchmark and intended elevations for the Work are as indicated.

3.1.1.2.2. Identify required lines, levels, contours, and datum.

3.1.1.2.3. Identify known utilities. Stake and flag locations.

3.1.1.2.4. Maintain and protect existing utilities remaining which pass through work area.

3.1.1.2.5. Verify fill materials to be reused are acceptable to Geotechnical engineer.

3.1.1.2.6. Prior to placement of fill material, verify scarification and compaction of excavated surface is complete.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.1.2. Preparation

- 3.1.2.1.** Provide all staking and field engineering required to implement the work as shown on the drawings.
- 3.1.2.2.** Protect all stakes and benchmarks. Replace all stakes and benchmarks damaged during the course of construction at no cost to Owner.
- 3.1.2.3.** Set grade stakes, using instrument technology, at 25 foot grid interval at areas with gradients less than 2 percent.
- 3.1.2.4.** Provide all equipment of such type, function and design as required to achieve specified values. Where necessary, provide rubber tired and vibratory sheepsfoot compaction equipment.

3.1.3. When the Geotechnical Engineer determines existing soils in excavated areas do not provide sufficient bearing capacity or are otherwise unacceptable, remove such soils as necessary to expose soils with adequate capacity and characteristics, as approved by the Geotechnical Engineer.

3.1.4. Clearing and Grubbing

- 3.1.4.1.** Where surficial grasses, weeds and other vegetation has grown in areas of work previously cleared, remove such vegetation to a minimum depth of two inches below existing grade under this contract.
- 3.1.4.2.** Discing and mixing of vegetation, trash, debris, and other deleterious materials with surface soils prior to grading is not permitted.
- 3.1.4.3.** Remove all buried debris, rubble, trash, or other material not deemed suitable by the Geotechnical Engineer.

3.2. TOPSOIL EXCAVATION

- 3.2.1.** After completion of clearing and grubbing, remove existing topsoil in excavated areas of work and where fill is to be placed on existing grade. Remove topsoil to depth of 4 inches. Stockpile on site for spreading at landscaped areas.
- 3.2.2.** Stockpile topsoil to depth not exceeding 4 feet with 1:2 slope banks. Cover and protect from erosion.

3.3. SUBSOIL EXCAVATION

- 3.3.1.** Excavate soil in work areas under this contract as specified in this Section.
 - 3.3.1.1.** Stockpile excavated material for reuse. Segregate material complying with specified criteria as suitable for re-use as compacted structural fill.
 - 3.3.1.2.** Where approved by Geotechnical Engineer, on-site material that does not comply with structural fill criteria may be used for earthwork that does not support structures or paving.
 - 3.3.1.3.** After completion of grading, remove unsuitable and excess soils from site in conformance with the regulations of jurisdictional authority.
- 3.3.2.** Excavate subsoil required to accommodate building foundation, slabs-on-grade, paving, landscaped areas, site contouring and site structures.

- [illegible]

- 3.3.5.5.** Prior to scarification and compaction, obtain Geotechnical Engineer review and acceptance of excavated surface, and remove additional materials as required.

3.4. COMPACTION OF EXCAVATED SURFACES

- 3.4.1.** Prepare areas designated to receive subsequent fill and backfill materials, Portland cement or asphaltic concrete paving as follows:
 - 3.4.1.1.** Scarify subgrade to a depth of 6 inches.
 - 3.4.1.2.** Water, mix and aerate as necessary to moisture condition within 1 percent minimum to 3 percent maximum optimum moisture content.
 - 3.4.1.3.** Compact to a relative compaction of 90 percent based on ASTM D 1557.
 - 3.4.1.4.** Compact to a relative compaction of 95 percent at paving areas based on ASTM D 1557.
- 3.4.2.** Prepare areas designated to receive landscaping as follows:
 - 3.4.2.1.** Scarify subgrade to a depth of 6 inches.
 - 3.4.2.2.** Water, mix and aerate as necessary to moisture condition within 1 percent minimum to 3 percent maximum optimum moisture content.
 - 3.4.2.3.** Compact to a relative compaction of 90 percent based on ASTM D 1557.

3.5. FILL PLACEMENT

- 3.5.1.** Place fill with specified materials at locations as scheduled below.
 - 3.5.1.1.** Provide all cribbing, shoring, and sheathing required to perform work. Comply with all applicable regulations for design, installation, maintenance and removal of such construction products, including obtaining any required permits.
- 3.5.2.** Do not place fill over porous, wet, or spongy subgrade.
- 3.5.3.** Systematically backfill to allow maximum time for natural settlement.
- 3.5.4.** Use equipment and procedures outlined in Green Book Section 300-4 and as specified. Green Book Section 300-4.9 is not applicable.
 - 3.5.4.1.** Place and compact materials in continuous layers not exceeding 6 inches compacted depth using methods which do not disturb or damage foundations, perimeter drainage and waterproofing systems, or utilities in trenches.
 - 3.5.4.2.** Rock encountered may be broken into material complying with fill characteristics, at Contractors option. Otherwise remove all rock exceeding fill dimensions from site.
 - 3.5.4.3.** Compact all fill material as scheduled in this Section per ASTM D 1557.
 - 3.5.4.4.** Overfill all slope banks and compact. After compaction, trim to grade and contour as shown on drawings.

- 3.5.5.** Where occurs, place fill concurrently on both sides of foundation elements in maximum 6 inch compacted layers. Compact to 90 percent of maximum density per ASTM D 1557 with mechanical tampers per Article 3.3.4 above.
- 3.5.6.** Compaction by flooding or jetting is prohibited.
- 3.5.7.** Maintain moisture content of fill materials to within 2 percent of optimum and as required to attain required compaction density.
- 3.5.8.** Slope grade as shown on drawings.
- 3.5.9.** Make grade changes gradual, blending slope into level areas. After completion of grading operation, proof roll earthwork areas. Repair low or spongy spots developed during rolling operation.
- 3.5.10.** Extend compacted fill to design surfaces of slopes and compact surface.
- 3.5.11.** Remove all excess soils and dispose off site in a legal manner.
- 3.5.12.** Provide all fill material required to achieve grades, slopes and contours as shown on drawings at no additional expense to Owner.
- 3.5.13.** Provide dust control as required per this section. Conform to Storm Water Pollution Protection Plan procedures and methods as shown on current SWPPP. Update plan as required. See Section 01 50 00.

3.6. FIELD QUALITY CONTROL

- 3.6.1.** Field inspection will be performed under provisions of Section 01 45 29.
- 3.6.2.** Geotechnical Engineer shall verify the suitability of soil materials.
- 3.6.3.** Field inspection and testing will be performed under provisions of Section 01 45 29, and conducted by the Owners Geotechnical Engineer.
- 3.6.4.** Perform earthwork under the continuous observation of the Owner's Geotechnical Engineer. Earthwork fill operations shall comply with the requirements of Part 2, Title 24, CCR.
- 3.6.5.** Tests and analysis of fill material will be performed in accordance with ASTM D1557.
 - 3.6.5.1.** The Geotechnical Engineer will review and approve all fill materials, including on-site materials and imported materials.
 - 3.6.5.2.** The Geotechnical Engineer will submit reports to the Architect, DSA, and Engineer, comparing results of testing with the requirements of this section and documenting location and scope of tested materials.
- 3.6.6.** Compaction testing will be performed in accordance with ASTM D1556 or other referenced methods.
- 3.6.7.** If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

3.7. TOLERANCES

- 3.7.1.** Final elevations shall comply with grades as shown on drawings.

- 3.7.2.** Lawn or unimproved areas: Plus or minus 1 inch.
 - 3.7.3.** Walks: Plus or minus 1 inch.
 - 3.7.4.** Pavement: Plus or minus 1/2 inch.
 - 3.7.5.** Not more than one point within any 50 x 50 foot area shall exceed required elevations, measured to a tolerance of plus or minus 0.1 feet.
- 3.8. PROTECTION**
 - 3.8.1.** Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.
 - 3.8.2.** Protect finished Work under provisions of Section 01 50 00.
 - 3.8.3.** Re-compact fills subjected to vehicular traffic.
- 3.9. DUST CONTROL**
 - 3.9.1.** Provide for dust control under the provisions of Section 01 50 00.
 - 3.9.2.** Maintain all streets and public ways free of dust and mud as directed by local jurisdictional authority, including use of wash down and street sweeper equipment.
- 3.10. FILL SCHEDULE**
 - 3.10.1. Structures.**
 - 3.10.1.1.** Place approved fill material, placed to depth as necessary to achieve required subgrade elevations.
 - 3.10.1.2.** The uppermost 6 inches of fill material below footings shall be specified structural non-expansive fill material.
 - 3.10.1.3.** The uppermost 6 inches of fill below base course at building slabs-on-grade shall be specified structural non-expansive fill material.
 - 3.10.1.4.** Compact to 90 percent relative compaction.
 - 3.10.2. Paving Areas.**
 - 3.10.2.1.** Place approved fill material, placed to depth as necessary to achieve required subgrade elevations.
 - 3.10.2.2.** The uppermost 12 inches of fill below base course at paving areas shall be specified structural non-expansive fill material.
 - 3.10.2.3.** Compact upper 6 inches to 95 percent relative compaction, and 90 percent for remainder.
 - 3.10.3. Fill to Correct Over-excavation:**
 - 3.10.3.1.** Concrete as specified or fill material as directed by, and at the discretion of, the Geotechnical Engineer.

END OF SECTION

SECTION 31 23 33

TRENCHING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1. Excavate trenches for utilities and services.
- 1.1.2. Compacted bedding.
- 1.1.3. Backfilling and compaction.

1.2. REFERENCES

- 1.2.1. ASTM C136 -- Standard Test Method for Sieve Analysis of Fine and Course Aggregates.
- 1.2.2. ASTM D1556 -- Standard Test Method for Density of Soil in Place by the Sand - Cone Method.
- 1.2.3. ASTM D1557-- Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³).
- 1.2.4. ASTM D2922 -- Standard Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- 1.2.5. ASTM D3017-- Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
- 1.2.6. Green Book - Standard Specifications for Public Works Construction, latest edition, as adopted by jurisdictional authority, including amendments. Geotechnical Reports - As identified described in *Document Section 00 31 32*.

1.3. QUALITY ASSURANCE:

1.3.1. Contractor Qualifications

- 1.3.1.1. Installing Company: Company specializing in grading and excavation work, with minimum 5 years documented experience in projects of similar scale and scope.
- 1.3.1.2. Installing Foreman: Individual specializing in grading and excavation work, with minimum 5 years documented experience in projects of similar scale and scope.

1.4. PROJECT RECORD DOCUMENTS

- 1.4.1. Submit documents under provisions of Section 01 77 19.
- 1.4.2. Accurately record location of utilities remaining, rerouted utilities, new utilities by horizontal dimensions, elevations or inverts, and slope gradients.

1.5. PROTECTION

- 1.5.1.** Protect trees, shrubs, lawns, rock outcropping, and other features remaining as portion of final landscaping.
- 1.5.2.** Protect benchmarks, existing structures, fences, roads, sidewalks, paving and curbs.
- 1.5.3.** Protect above or below grade utilities, which are to remain.

1.6. PUBLIC AGENCY STANDARDS

- 1.6.1.** Perform all earthwork and related structures and devices indicated as public agency standards in accordance with the standard plans and specifications of that agency.
- 1.6.2.** Where earthwork is constructed in public streets or rights of way, construct in accordance with the standard plans and specifications of the authority having jurisdictions and in the presence of a representative of that agency.
- 1.6.3.** Secure and pay for all necessary permits for work performed under conditions which exist in 1.6.2 above. The Owner will pay for associated inspection fees.
- 1.6.4.** Upon completion of the work, provide the Architect with written certification of acceptance of work by the governing agency having jurisdiction.

2. PART 2 - PRODUCTS

2.1. BACKFILL MATERIALS

- 2.1.1.** Type C - Class 100-E-100 per Table 201-1.1.2 (Green Book) slurry mix *Slurry cement backfill per Section 19-3.062*, as approved by Owner and geotechnical engineer.
- 2.1.2.** Type D - Select Backfill: On Site or imported non-expansive soils complying with Section 31 00 00.

2.2. BEDDING MATERIALS

- 2.2.1.** Type A - Crushed Gravel: Angular, natural stone; free of shale, clay, friable material, sand, debris; graded within the following limits:

Sieve Size	Percent Passing
3/4 inch	95 to 100
No. 4	0 to 10
No. 100	0

- 2.2.2.** Type B - Sand: Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, or organic matter; maximum particle size and volume of 1/2 inch and 18 percent respectively, with minimum Sand Equivalent value of 30 per California Test Method 217. Type E - Concrete Encasement: Class 480-C-2000 per Table 201-1.1.2 (Green Book) as approved by Owner and geotechnical engineer.

2.3. ACCESSORIES

- 2.3.1.** Detection tape: Provide plastic tape with metallic stripping suitable for locating underground piping and conduits. Provide pre-printed label identifying conduit/pipe type, alternating with word "CAUTION".

2.4. DESIGN CRITERIA

2.4.1. General

- 2.4.1.1.** All improvements shall be constructed per the referenced standards, the contract documents, and as specified in this section.
- 2.4.1.2.** Where criteria shown on drawings or specified in this specification exceed that of the referenced standards, the more stringent criteria shall apply.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

- 3.1.1.1.** Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
- 3.1.1.2.** Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 - 3.1.1.2.1.** Verify that survey benchmark and intended elevations for the Work are as indicated.
 - 3.1.1.2.2.** Identify required lines, levels, contours, and datum.
 - 3.1.1.2.3.** Identify known utilities. Stake and flag locations.
 - 3.1.1.2.4.** Maintain and protect existing utilities remaining which pass through work area.
 - 3.1.1.2.5.** Verify proposed fill material is acceptable to Geotechnical Engineer.
 - 3.1.1.2.6.** Where trenching occurs in landscaped areas, verify proposed fill material is acceptable to Landscape Architect.
- 3.1.1.3.** In the event of discrepancy, immediately notify the Architect.
- 3.1.1.4.** Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

3.2.1. Identify required lines, levels, contours, and datum.

- 3.2.1.1.** Provide all staking and field engineering required to implement the work as shown on the drawings.
- 3.2.1.2.** Protect all stakes and benchmarks. Replace all stakes and benchmarks damaged during the course of construction at no cost to Owner.
- 3.2.1.3.** Set grade stakes using instrument technology.

- 3.2.1.4.** Provide all equipment of such type, function and design as required to achieve specified grades, alignment, and values.

3.2.2. Existing Utility and Services Criteria.

- 3.2.2.1.** Locate all existing water, sanitary sewer, storm drain, and gas lines, electrical and telephone conduit and other underground utilities, including service connections and all other underground structures affected by work of this contract.
- 3.2.2.2.** Review existing record drawings, conduct site investigations, retain qualified cable/pipe/line locator services, and implement all other means necessary to define the location of underground systems. Obtain all necessary permits for safety or otherwise, and comply with conditions of permit.
- 3.2.2.3.** Obtain and review all available drawings, notes, and information on the location of underground lines and structures in determining the location of the existing facilities.
- 3.2.2.4.** Prior to demolition or disconnect, obtain Owners approval that such system does not impact facilities or systems beyond the extent of this contract.
- 3.2.2.5.** Pothole utility lines in advance of construction to permit any required adjustment in horizontal or vertical location of pipe line. Submit drawing to Architect showing utility line locations. Backfill pothole, compact and restore surface improvements in accordance with these specifications or in accordance with local jurisdiction having authority if applicable.
- 3.2.2.6.** Maintain electronic pipe finder on the job at all times.
- 3.2.2.7.** Mark all existing lines in advance of trenching operations.
- 3.2.2.8.** Document any surface defects, by photographic or other approved means, prior to conducting trenching operations. Upon completion of construction, all concrete showing non-documented settlement, spalls, gouges, cracks or other defects will be evidence of damage by the Contractor's forces. Repair or replace such damaged surfaces to the satisfaction of the Architect.
- 3.2.2.9.** Return all surface improvements designated to remain, which are removed for excavation, to their original condition, except to comply with other portions of the contract.
- 3.2.2.10.** Prior to commencing trenching, obtain all necessary permits for safety or otherwise, and comply with conditions of permit.

3.3. EXCAVATION

3.3.1. Excavate subsoil required for utilities.

- 3.3.1.1.** Remove all earth, sand, gravel, water, quicksand, stone, loose rock, solid rock, clay, shale, cement, hardpan, boulders, and all other materials necessary to be moved in excavating the trench for the designated pipe or conduit.
- 3.3.1.2.** Maintain the excavation by trench sidewall support systems, including shoring, bracing, sheeting or well pointing in compliance with all required regulations.

- 3.3.1.3.** Remove trench sidewall support systems from trench after installation.
 - 3.3.2.** Maximum length of open trench:
 - 3.3.2.1.** Except by permission of the Owner, no open trench is permitted overnight.
 - 3.3.3.** Trench Width
 - 3.3.3.1.** Provide trench width as indicated on the drawings.
 - 3.3.3.2.** Provide minimum 12 inches clear excavation between outer surfaces and the trench sidewall or bracing at manholes, concrete valve boxes, and similar structures.
 - 3.3.4.** Where trench is parallel to footing, do not permit trench bottom below a plane having a downward slope of 2:1 (H:V) beginning from a line 9 inches above the bottom of the footing, nor closer than 18 inches to face of footing.
 - 3.3.5.** Excavate trenches to the depths shown on the drawings, including any required allowances for bedding under the pipe, when required, and for the pipe groove.
 - 3.3.6.** Rock Considerations:
 - 3.3.6.1.** Remove all rock of any kind, including material requiring removal by use of heavy earthwork equipment, hydro-hammers, or blasting within upper five feet of finished or existing grade, whichever is lower.
 - 3.3.6.2.** A contract adjustment will be made for removal of rock below five foot depth.
 - 3.3.7.** Provide cover over the top of the pipe as specified or, if not specified, the minimum cover, including any paving, as required by local jurisdiction having authority.
 - 3.3.8.** Hand trim excavation. Hand excavate for pipe joints. Remove loose matter.
 - 3.3.9.** Remove lumped subsoil, boulders, and rock.
 - 3.3.10.** Correct unauthorized excavation at no cost to Owner.
 - 3.3.11.** Correct areas over-excavated by error in accordance with Section 31 00 00.
 - 3.3.12.** Remove excess material not being used from site.
 - 3.3.13.** Test and inspect all utility lines prior to backfilling.
 - 3.3.14.** Record and verify "As-Built" elevations and locations on Record Drawings prior to backfilling.
- 3.4.** BEDDING
 - 3.4.1.** Place and compact bedding material as shown on drawings.
 - 3.4.2.** Comply with requirements specified in this Section.
 - 3.4.3.** Where concrete encasement is shown, place free of voids and segregation of materials. Consolidate as required by Geotechnical Engineer.

3.5. BACKFILLING

- 3.5.1.** Backfill trenches to finish grade with specified materials to depths and levels indicated in as specified in this Section and Section 31 00 00.
- 3.5.2.** Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
 - 3.5.2.1.** Maintain all trenches free from water during the progress of the work.
 - 3.5.2.2.** When required by weather conditions, provide channel adjacent to pipe, conduct water to sump and pump out of trench. Do not permit water to enter the pipe.
- 3.5.3.** Fill: Place and compact material in continuous layers.
 - 3.5.3.1.** Compact by mechanical means by the use of sheeps-foot rollers, pneumatic tire rollers, vibrating rollers, or other mechanical tampers of a size and type necessary to achieve the required degree of compaction.
 - 3.5.3.2.** No jetting or water compaction will be allowed.
 - 3.5.3.3.** Backfill in lifts not exceeding 6 inches in compacted thickness.
 - 3.5.3.4.** Compact trenching located in paving areas to 95 percent in the upper 6 inches, and 90 percent for the remainder.
 - 3.5.3.5.** Compact trenching located in landscaped areas to 90 percent.
 - 3.5.3.6.** Place detection tape at 12 inches above uppermost portion of pipe or conduit. Extend in continuous alignment with pipe or conduit.
- 3.5.4.** Employ a placement method that does not disturb or damage foundation perimeter drainage or utilities.
- 3.5.5.** Maintain optimum moisture content of backfill materials to attain required compaction density.
- 3.5.6.** Remove surplus backfill materials from site.
- 3.5.7.** Leave site completely free of excess fill materials.
- 3.5.8.** Slurry Backfill: Place slurry backfill at all trenches located in paved areas as shown on drawings and as directed by Geotechnical Engineer.

3.6. FIELD QUALITY CONTROL

- 3.6.1.** Field inspection and testing will be performed under provisions of Section 01 45 29, and conducted by the Owners Geotechnical Engineer.
 - 3.6.1.1.** Perform earthwork under the continuous observation of the Owner's Geotechnical Engineer. The Geotechnical Engineer will submit reports to the Architect, and Engineer, comparing results of testing with the requirements of this section and documenting location and scope of tested materials.
- 3.6.2.** Tests and analysis of fill material will be performed in accordance with ASTM D1557.

- 3.6.3.** Compaction testing will be performed in accordance with ASTM D 1556 and ASTM D 1557.
- 3.6.4.** If tests indicate Work does not meet specified requirements, remove Work replace and retest at no cost to Owner.
- 3.7.** PROTECTION OF FINISHED WORK
- 3.7.1.** Protect finished Work under provisions of Section 01 50 00.
- 3.7.2.** Recompact fills subjected to vehicular traffic.
- 3.8.** SCHEDULE
- 3.8.1.** Concrete Encasement:
- 3.8.1.1.** On-Site Conduit: Type E concrete as specified and as shown on drawings.
- 3.8.2.** Bedding Fill:
- 3.8.2.1.** On-Site Piping: Type B, minimum 4 inches below and 12 inches above pipe crown, and per referenced standard.
- 3.8.3.** Backfill - Unpaved areas:
- 3.8.3.1.** Type D.
- 3.8.3.2.** Place in accordance with Section 31 23 23 and as specified in this Section.
- 3.8.4.** Backfill - Paved areas:
- 3.8.4.1.** Type C slurry mix backfill.
- 3.8.4.2.** Place as directed by Owner and geotechnical engineer and as specified in this Section.

SECTION 31 31 16

TERMITE CONTROL

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Soil treatment for termite control below grade and at interior and exterior foundation perimeter.

1.2. REFERENCES

- 1.2.1.** EPA - Environmental Protection Agency - Federal Insecticide, Fungicide and Rodenticide Act.
- 1.2.2.** California Healthy Schools Act (AB 2260) regulations as established by the California Department of Education.

1.3. SUBMITTALS

- 1.3.1.** Submit under provisions of Section 01 33 00.
- 1.3.2.** Product Data: Indicate each toxicant to be used, composition by percentage, dilution schedule, intended application rate.
- 1.3.3.** Pesticide Use Report: Prior to application, prepare draft pesticide use report. Coordinate format and schedule with District staff. Following completion of application, provide final form.
- 1.3.4.** Manufacturer's Installation Instructions: Indicate caution requirements.

1.4. PROJECT RECORD DOCUMENTS

- 1.4.1.** Submit under provisions of Section 01 77 19.
- 1.4.2.** Accurately record moisture content of soil before application, date and rate of application, areas of application, diary of meter readings and corresponding soil coverage.

1.5. MAINTENANCE DATA

- 1.5.1.** Submit under provisions of Section 01 77 19.
- 1.5.2.** Maintenance Data: Indicate retreatment schedule.

1.6. QUALIFICATIONS

- 1.6.1.** Applicator: Company specializing in performing the work of this Section with minimum 10 years documented experience approved by manufacturer and licensed by the State of Arizona.

1.7. REGULATORY REQUIREMENTS

- 1.7.1.** Conform to applicable Arizona codes and regulations for requirements for application, application licensing, and authority to use toxicant chemicals in accordance with EPA.

1.8. SEQUENCING

- 1.8.1.** Apply toxicant immediately prior to installation of sand cushion under slabs-on-grade and not more than 12 hours prior to installation of vapor barrier under slabs-on-grade. At outside perimeter of foundations, apply after finish grading work.

1.9. WARRANTY

- 1.9.1.** Provide five year warranty under provisions of Section 01 77 19.
- 1.9.2.** Warranty: Include coverage for damage and repairs to building and building contents caused by termites. Repair damage. Retreat where required.
- 1.9.3.** Inspect and report annually to Owner in writing.

2. PART 2 - PRODUCTS

2.1. MATERIALS

- 2.1.1.** Toxicant Chemical: Generic chemical, EPA and Local authority approved; synthetically color dyed to permit visual identification of treated soil.
- 2.1.2.** Diluent: Recommended by toxicant manufacturer.

2.2. MIX

- 2.2.1.** Mix toxicant to manufacturer's instructions.

2.3. OTHER MATERIALS

- 2.3.1.** Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

- 3.1.1.** Inspection
 - 3.1.1.1.** Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
 - 3.1.1.2.** Verify that concrete pavement may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 - 3.1.1.3.** In the event of discrepancy, immediately notify the Architect.
 - 3.1.1.4.** Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. APPLICATION

- 3.2.1.** Spray apply and inject toxicant in accordance with manufacturer's instructions and per referenced regulations.
- 3.2.2.** Apply toxicant at locations indicated in Schedule at end of Section.
- 3.2.3.** Apply extra treatment to structure penetration surfaces such as pipe or ducts, and soil penetrations such as grounding rods or posts.
- 3.2.4.** Retreat disturbed treated soil with same toxicant as original treatment.
- 3.2.5.** If inspection or testing identifies the presence of termites, retreat soil and retest.

3.3. PROTECTION OF FINISHED WORK

- 3.3.1.** Protect finished Work under provisions of Section 01 50 00.
- 3.3.2.** Do not permit soil grading over treated work.

3.4. SCHEDULES

- 3.4.1.** Locations:
 - 3.4.1.1.** Under Slabs-on-Grade.
 - 3.4.1.2.** Crawl Spaces.
 - 3.4.1.3.** Exterior Side of Foundation Surface.
 - 3.4.1.4.** Soil Within 5 feet of Building Perimeter for a Depth of 2 feet.

END OF SECTION

SECTION 32 12 16

ASPHALT PAVING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Asphalt concrete pavement.
- 1.1.2.** Aggregate base course.
- 1.1.3.** Paving accessories as specified.

1.2. REFERENCES

- 1.2.1.** Standard Specifications for Public Works Construction (SSPWC - "Green Book") latest edition, as adopted by jurisdictional authority, including amendments.
- 1.2.2.** ASTM D 1188 - Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures
- 1.2.3.** ASTM D1557 - Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³).
- 1.2.4.** ASTM D 2170 - Test Method for Kinematic Viscosity of Asphalts (Bituminous)
- 1.2.5.** ASTM D 2172 - Test Method for Quantitative Extraction of Bitumen from Bituminous Paving Mixtures

1.3. SUBMITTALS

- 1.3.1.** Mix Design: Submit asphalt mix design prepared by a certified laboratory, selected by Owner and acceptable to Owner, for review and approval.
- 1.3.2.** Accompanying mix design, submit materials certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

2. PART 2 - PRODUCTS

2.1. AGGREGATE BASE COURSE MATERIAL

- 2.1.1.** Provide "Crushed Aggregate Base" per SSPWC Section 200-2.2,

2.2. ASPHALTIC CONCRETE PAVEMENT MATERIALS

- 2.2.1.** Asphaltic Concrete Pavement Mixture:

- 2.2.1.1.** Mix Characteristics:

- 2.2.1.1.1.** Vehicular Paving: Type III, Class C2 per SSPWC Section 400-4.

2.2.1.2. Asphalt type: Provide AR-4000 per SSPWC Section 203-1. Based on weather conditions, propose alternate type in mix design.

2.2.1.3. Asphaltic concrete pavement shall be produced at a commercial central mixing plant.

2.2.2. Tack Coat: Slow setting asphalt emulsion SS1h per SSPWC Section 203-3.

2.2.3. Herbicide: Provide approved herbicide, tinted for visual identification, non-flammable formulation, and complying with all current EPA environmental regulations.

2.2.4. Surface Sealer: Asphalt Emulsion, www.aema.org, SS1-h, per SSPWC Section 203-9.

2.2.5. Surface Sealer: BIPCO, phone (760) 599-7210, Series 180, no known equal.

2.2.6. Surface Sealer: Guard Top by Vulcan Materials, Satin Seal by Blue Diamond or equal.

2.2.7. Crack filler:

2.2.7.1. Cracks less than 1/2 inch in width: GuardTop Crackfiller or equal.

2.2.7.2. Cracks 1/2 inch or greater in width: #4 Sheet mix asphalt.

2.3. REDWOOD HEADERS

2.3.1. Provide Redwood stakes and headers, construction heart per CRIS grading rules, sized in accordance with SSPWC Section 302-5.5.

2.4. OTHER MATERIALS

2.4.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

2.5. DESIGN CRITERIA

2.5.1. General:

2.5.1.1. All improvements shall be constructed per the referenced standards, the contract documents, and as specified in this section.

2.5.1.2. Where criteria shown on drawings or specified in this specification exceed that of the referenced standards, the more stringent criteria shall apply.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS AND PREPARATION

3.1.1. Inspection:

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

- 3.1.1.3.** In the event of discrepancy, immediately notify the Architect.
- 3.1.1.4.** Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.1.2. Preparation:

- 3.1.2.1.** Provide all staking and field engineering required to implement the work as shown on the drawings.
- 3.1.2.2.** Protect all stakes and benchmarks. Replace all stakes and benchmarks damaged during the course of construction at no cost to Owner.
- 3.1.2.3.** Set grade stakes, using instrument technology, at 25 foot grid interval at areas with gradients less than 2 percent.
- 3.1.2.4.** Provide all equipment of such type, function and design as required to achieve specified values.

3.2. APPLICATION OF SOIL TREATMENTS

3.2.1. Herbicide Treatment:

- 3.2.1.1.** Apply in strict accordance with Manufacturer's recommendations.
- 3.2.1.2.** Conform to all applicable and current regulations, air quality and environmental requirements.
- 3.2.1.3.** Do not apply herbicide within a minimum distance of two feet from planted areas.
- 3.2.1.4.** If requested by Architect, provide written certification of purchase and application of herbicide.

3.3. PLACEMENT OF AGGREGATE BASE COURSE

3.3.1. Deliver base course to site as uniform mixtures.

3.3.2. Spread each layer in one operation, free from pockets of coarse or fine material , and in compliance with SSPWC 302-2.

- 3.3.2.1.** Where asphalt paving is installed to replace existing on-site locations, match existing base thickness.
- 3.3.2.2.** Where asphalt paving is installed at public improvements, comply with base thickness required by referenced City standards.
- 3.3.2.3.** Where asphalt paving is installed at areas without prior paving, provide minimum 6 inch compacted base thickness.

3.3.3. Application:

- 3.3.3.1.** Where the required thickness is 0.5 foot or less, spread and compact base in one layer.

3.3.3.2. Where the required thickness is more than 0.5 foot, spread and compact base material in two or more layers of approximately equal thickness. The maximum compacted thickness of any one layer shall not exceed 0.5 foot, or less if compaction cannot be obtained with 0.5 lift.

3.3.4. Each layer shall be spread and compacted in a similar manner. When vibrating or other acceptable types of special compacting equipment are used, the entire course may be placed in one layer, provided the ability of such equipment to achieve acceptable compaction to the full layer depth is demonstrated.

3.3.5. No thin layers of fine materials shall be added to the top layer of the subbase or base course in order to meet the grade.

3.4. BASE COURSE COMPACTION AND PROTECTION

3.4.1. Compact base course material to not less than 95 of the maximum laboratory density as determined by ASTM D-1557.

3.4.2. Remove damaged base course to subgrade and place, grade and compact new base course in settled, eroded, and wetted areas to specified tolerances.

3.4.3. Where completed base course areas are disturbed by subsequent construction operations or adverse weather, remove base course in damaged areas to subgrade, and place and compact new base course to required density prior to further construction.

3.5. PREPARATION FOR PAVING

3.5.1. Apply tack coat to vertical faces of existing or previously constructed bituminous pavement, curbs, gutters, slab edges, and all structures to be in actual contact with the bituminous pavement.

3.5.2. Coat surfaces of catch basin frames with oil to prevent bond with asphalt pavement. Do not tack coat these surfaces.

3.5.3. Prior to applying the tack coat, sweep or otherwise clean surface free of dust or other foreign material.

3.5.4. Protect all surfaces not required to receive tack coat from any inadvertent application.

3.5.5. Do not place tack coat when air temperature in the shade or the roadbed temperature is below 50 degrees F, or during rain, fog, or other adverse weather conditions.

3.5.6. After application of tack coat, allow sufficient time for complete separation of asphalt and water before paving operations begin. Do not leave tack coat exposed overnight. Apply tack coat to only those surfaces as will be paved in the same day.

3.5.7. Apply primer coat to base course surfaces in conformance with Section 302-5.3, SSPWC, at rate of 0.10 to 0.25 gallons per square yard. Allow to cure prior to application of asphalt course.

3.5.8. Asphalt Pavement Crack Preparation:

3.5.8.1. All asphalt cracks shall be cleaned, prepared and filled prior to application of tack coat.

- 3.5.8.2.** All vegetation shall be removed from cracks and blown clean with compressed air.
- 3.5.8.3.** Cracks shall be treated with specified soil sterilizer prior to placement of filler material.
- 3.5.8.4.** Cracks shall be completely free of any moisture before application of filler. Sufficient amount of crack filler shall be used to ensure a level surface after filler is cured.
- 3.5.8.5.** Multiple coats may be required, within Manufacturer's recommendations.
- 3.5.8.6.** Asphalt pavement cracks less than 1/2 inch wide shall be filled with rubberized crack filler as specified.
- 3.5.8.7.** Asphalt pavement cracks 1/2 inch wide or larger shall be filled with #4 sheet mix asphalt.

3.6. PLACEMENT OF ASPHALTIC CONCRETE PAVEMENT

- 3.6.1.** Conform to SSPWC Section 302-5.
- 3.6.2.** Do not place asphaltic concrete paving when the air temperature in the shade or the roadbed temperature is below 50 degrees F, or during rain, when the base course surface is wet, or during other adverse weather conditions.
- 3.6.3.** Place asphalt pavement as required to provide compacted depth as indicated on the plans, in a continuous operation. Place inaccessible and small areas by hand.
 - 3.6.3.1.** Provide minimum 3 inch compacted thickness or as required to match existing, whichever is greater.
 - 3.6.3.2.** Where asphalt paving is installed to replace existing on-site locations, install in compacted thickness to match existing paving.
 - 3.6.3.3.** Where asphalt paving is installed over pavement fabric, provide minimum 1-1/2 inch compacted thickness.
 - 3.6.3.4.** Where asphalt paving is installed at public improvements, comply with compacted paving thickness required by referenced City standards.
 - 3.6.3.5.** Where asphalt paving is installed at areas without prior paving, provide minimum 3 inch compacted thickness.
- 3.6.4.** Place asphalt in single or multiple lifts per SSPWC Section 302-5.5.
- 3.6.5.** Ensure joints made during paving operations are straight, clean, vertical and free of broken or loose material. Carefully make joints to insure a continuous bond between old and new pavement, or between successive day's work. Provide a continuous bond between adjoining work.
- 3.6.6.** At all unrestrained paving edges, provide redwood headers flush with asphalt concrete surface, with stakes placed at 3 feet on center maximum, located 1/2 inch below top of header.

3.7. ROLLING

- 3.7.1.** Monitor temperatures of the asphalt concrete mixture as delivered to the site and during laydown to insure conformance with SSPWC Section 302-5.5.
- 3.7.2.** Roll and compact to specified density in accordance with SSPWC Section 302-5.6.
- 3.7.3.** Compact asphalt paving course to 95 percent of the maximum laboratory density, as obtained with the California Kneading Compactor, per California Test 304.
- 3.7.4.** Perform hand tamping in areas not accessible to rolling equipment.

3.8. FIELD QUALITY CONTROL

- 3.8.1.** Testing and inspection of asphaltic concrete mix and asphalt pavement will be performed at Contractors cost by a testing laboratory retained by the Contractor and acceptable to the Owner. The testing laboratory, except for the contract relationship required for this project, shall have no financial or fiduciary relationship with Contractor or paving installer.
- 3.8.2.** Thickness Cores:
 - 3.8.2.1.** Provide 1 core test per each 5,000 square feet or each repair area to verify compacted thickness.
- 3.8.3.** Density Tests:
 - 3.8.3.1.** Provide field density tests indicating compliance with SSPWC Section 302-5.6.2 based on use of properly calibrated nuclear asphalt testing device.
 - 3.8.3.2.** Provide density tests based on ASTM D 1188 for laboratory analysis of asphalt cores.
 - 3.8.3.3.** In the event of disputes over in-place density, conduct tests based on ASTM D 1188 with test samples taken at such frequency as directed by Architect.
- 3.8.4.** Surface smoothness, thickness and level.
 - 3.8.4.1.** Maintain surface free of gouges, ridges and ruts, with a uniform and consistent finish.
 - 3.8.4.2.** Maintain line and profile shown to tolerance of 1/4 inch plus/minus, in any 10 feet, non-cumulative.
 - 3.8.4.3.** Maintain asphalt pavement free from depressions exceeding 1/8 inch when measured with a 10 foot straight-edge.
- 3.8.5.** Flood Test:
 - 3.8.5.1.** Flood test paving prior to application of seal coat.
 - 3.8.5.2.** Where water ponds in excess of 1/8 inch in an area greater than 2 feet in any direction, repair or replace as directed by Architect to provide proper drainage.

3.9. SEAL COAT

- 3.9.1.** Allow completed paving to cure for minimum of 1 month prior to application of specified seal coat.
- 3.9.2.** Conform to the manufacturers recommendations for two coat application.
- 3.9.3.** Conform to SSPWC Section 302-8. for application.
- 3.9.4.** Provide surface finish free of ridges, lap marks, coarse textured areas, or other appearance and performance defects.

3.10. PROTECTION

- 3.10.1.** After final rolling, do not permit vehicular traffic on pavement until it has cooled to atmospheric temperature and hardened, but in no case less than 8 hours.
- 3.10.2.** Erect barricades in accordance with requirements of Division 1 to protect paving from traffic until mixture has cooled in accordance with the specifications.
- 3.10.3.** Do not use completed paving surface for storage of construction vehicles or construction materials.

END OF SECTION

SECTION 32 13 13
CONCRETE PAVING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1.** Concrete paving and walkways.
- 1.1.2.** Curbing/gutters, and related concrete improvements.

1.2. REFERENCES

- 1.2.1.** Organization and Trade Standards
- 1.2.2.** Standard Specifications for Public Works Construction, latest edition, as adopted by local jurisdictional authority, including amendments.
- 1.2.3.** Local jurisdictional and agency engineering and public works regulations and standards.
- 1.2.4.** Regional Standard Drawings, current edition, with all local agency amendments.

1.3. SUBMITTALS

- 1.3.1.** Mix Design/Materials List:
 - 1.3.1.1.** Submit concrete mix design prepared by a certified batch plant or laboratory, selected by Contractor and acceptable to Owner, for review and approval.
 - 1.3.1.2.** Accompanying mix design, submit materials certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

1.4. PUBLIC AGENCY STANDARDS

- 1.4.1.** Perform all paving and related structures and devices indicated as public agency standards in accordance with the standard plans and specifications of that agency.
- 1.4.2.** Where paving is constructed in public streets or rights of way, construct in accordance with the standard plans and specifications of the authority having jurisdictions and in the presence of a representative of that agency.
- 1.4.3.** Secure and pay for all necessary permits for work performed under conditions which exist in 1.5.2 above. The Owner will pay for associated inspection fees.
- 1.4.4.** Upon completion of the work, provide the Architect with written certification of acceptance of work by the governing agency having jurisdiction.

2. PART 2 - PRODUCTS

2.1. DESIGN CRITERIA

- 2.1.1.** General:

- 2.1.1.1.** All improvements shall be constructed per the referenced standards, the contract documents, and as specified in this section.
- 2.1.1.2.** Where criteria shown on drawings or specified in this specification exceed that of the referenced standards, the more stringent criteria shall apply.

2.2. CAST-IN-PLACE CONCRETE

2.2.1. General:

- 2.2.1.1.** All concrete shall be transit mixed, complying with ATSM C94.
- 2.2.1.2.** All concrete shall be supplied from a single source, using a single cement supplier.
- 2.2.1.3.** All cement shall be portland cement, Type II, low alkali per ASTM C150, and produced within the United States.

2.2.2. Product Characteristics: Paving/Flatwork/Ramps/Stairs:

- 2.2.2.1.** Compressive Strength: 3250 psi. Strength selected for durability. Concrete is non-structural, and does not require special inspection.
- 2.2.2.2.** Combined Aggregate Grading:
 - 2.2.2.2.1.** Class C per Standard Specification Section 201-1.3.2 .
 - 2.2.2.2.2.** Aggregate shall be non-reactive per ASTM C 289, and shall comply with ASTM C33, Table 3, Class 4M.
- 2.2.2.3.** Cement Content: 560 pounds per cubic yard concrete
- 2.2.2.4.** Slump: 4 inch maximum
- 2.2.2.5.** Water-Cement Ratio: 0.55 maximum.
- 2.2.2.6.** Finish: Per Section 303-5.5.2 of "Standard Specifications," and with flatwork finishes as defined in this Section and per Drawings.
- 2.2.2.7.** Flatwork Finish:
 - 2.2.2.8.** Paving Type CP-1: Broom finish per paragraph 3.2.3.5 of this Section.

2.2.3. Product Characteristics: Curbing, gutters, related drainage components.

- 2.2.3.1.** Compressive Strength: 2500 psi
- 2.2.3.2.** Combined Aggregate Grading:
 - 2.2.3.2.1.** Class C per Standard Specification Section 201-1.3.2.
- 2.2.3.3.** Cement Content: 520 pounds per cubic yard concrete
- 2.2.3.4.** Slump: 4 inch maximum

2.2.3.5. Finish: Per Section 303-5.5.2 of "Standard Specifications," and with flatwork finishes as defined in this Section and per Drawings.

2.2.3.6. Water-Cement Ratio: 0.55 maximum.

2.3. PAVING BASE

2.3.1. Where shown on drawings, provide crushed aggregate base per Section 200-2.2.1 of the "Standard Specification"

2.4. REINFORCING STEEL

2.4.1. Deformed bar: Comply with Section 03 20 00 and per Drawings.

2.4.2. Where deformed bar reinforcing not shown, provide welded wire fabric, flat sheet stock, 6x6-W2.9xW2.9 or approved equivalent, per ASTM A-185, at all concrete paving conditions.

2.4.3. Provide polyethylene closed end sleeve or approved alternate at expansion joint dowels.

2.5. EXPANSION JOINT MATERIAL

2.5.1. Expansion Joint Material: W. R. Meadows or equal, Sealtight Fiber filler, full depth of slab, matching profile, 1/2 inch thickness or as shown on drawings.

2.5.2. Expansion Joint Material - Radius Conditions: W. R. Meadows or equal, Sealtight Ceramar flexible foam resilient filler, full depth of slab, 3/8 inch thickness or as shown on drawings.

2.5.3. Joint Cap: W. R. Meadows or equal, SealTight Snap Cap, size required for expansion material.

2.6. WEAKENED PLANE JOINTS AND SCORELINES

2.6.1. Saw- cut, Sof-Cut, or tooled joint technique, with maximum tooled radius edge of 1/8".

2.6.2. No "zip-strip joint" products and technique permitted.

2.7. CURING AND SEALING COMPOUNDS

2.7.1. Curing Compound:

2.7.1.1. Provide Burke Aqua Resin, with fugitive dye, and complying with ASTM C309, Type 1-D at all natural color concrete curbing and non-paving applications.

2.7.2. Cure and Sealing Compound:

2.7.2.1. Provide Burke Spartan-Cote WB, complying with ASTM C309, Type 1-A and B, at natural color exterior concrete paving.

2.8. SEALANTS

2.8.1. Provide sealants complying with Section 07 90 00, at locations specified or as shown on drawings.

2.9. SLIP RESISTANT FINISH

- 2.9.1.** Provide Sonneborn, www.chemrex.com/sonneborn, or equal, Frictex NS aluminum oxide finish surfacer, at locations specified or as shown on drawings.

2.10. OTHER MATERIALS

- 2.10.1.** Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection:

- 3.1.1.1.** Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
- 3.1.1.2.** Verify that concrete pavement may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
- 3.1.1.3.** In the event of discrepancy, immediately notify the Architect.
- 3.1.1.4.** Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. CONCRETE PAVING INSTALLATION

3.2.1. Preparation:

- 3.2.1.1.** Verify sub-grade, base material, conduit, and all other embedded items are properly located in relation to concrete paving. Secure all embedded items against displacement during pour.
- 3.2.1.2.** Verify all grades for pitch and fall prior to pouring pavements.
- 3.2.1.3.** Verify that all cross-fall and ramp criteria comply with all accessibility regulations.
- 3.2.1.4.** Verify compaction of existing subgrade complies with criteria specified in Section 31 22 00 and 31 23 23.
- 3.2.1.5.** Notify inspector 48 hours prior to placing concrete. Obtain inspectors approval of subgrade, forming and embedded items prior to placing.

3.2.2. Forming:

- 3.2.2.1.** Install forms in accordance with specified tolerances.
- 3.2.2.2.** Stake rigidly in place at maximum intervals of 4 feet on center. Secure so as to prevent displacement during pouring and finishing process.

- 3.2.2.3. Install stretched wires or other device to provide form displacement indication.
- 3.2.2.4. Thoroughly clean forms, removing debris, coatings and foreign matter. Coat forms with approved bond breaker, suitable for use on integral colored concrete without staining or discoloration. Place sand bed over existing paving receiving new concrete paving.
- 3.2.3. Placement:
 - 3.2.3.1. Prepare subgrade as specified.
 - 3.2.3.1.1. Scarify subgrade to a depth of 12 inches.
 - 3.2.3.1.2. Water, mix and aerate as necessary to moisture condition within range of 1 percent below to 3 percent above optimum moisture content.
 - 3.2.3.1.3. Compact upper 12 inches to a minimum relative compaction of 95 percent based on ASTM D 1557.
 - 3.2.3.1.4. Dampen sub-grade 24 hours prior to placing concrete.
 - 3.2.3.1.5. Dampen forms as required to tighten joints and cracks in forming material.
 - 3.2.3.2. Install concrete paving per Section 303-5 of the "Standard Specifications", as specified, and as shown on drawings.
 - 3.2.3.2.1. Provide minimum slab thickness of 4 inches, unless noted otherwise,
 - 3.2.3.3. Install all curbing, cross gutters, and related improvements per Section 303-5 of the "Standard Specifications", as specified, and as shown on drawings. Where machine formed curbing is provided, tolerances and joint control specified for fixed form construction shall be met.
 - 3.2.3.4. Provide reinforcing in accordance with Section 03 20 00.
 - 3.2.3.4.1. Install deformed bar reinforcing on approved concrete or plastic supports. Install in accordance with Section 03 20 00.
 - 3.2.3.4.2. Drill existing concrete as shown on drawings for dowel embeds.
 - 3.2.3.4.3. Extend reinforcing bar at expansion joints on each side of joint. Sleeve one side.
 - 3.2.3.4.4. Where deformed bar reinforcing not shown, provide wire mesh reinforcing on approved concrete or plastic supports. Use of "Hook and Pull" method of reinforcing placement not acceptable. Lap all mesh minimum 12" at edges.
 - 3.2.3.5. Broom Finish :

- 3.2.3.5.1.** Float and steel trowel surface to required slopes and planes.
- 3.2.3.5.2.** Apply broom texture, transverse to direction of pedestrian travel, and using a stiff wire or nylon bristle broom.
- 3.2.3.5.3.** Unless specified otherwise, provide medium broom texture at locations shown on drawings. At ramp surfaces (surfaces exceeding 5 percent slope in direction of travel), provide heavy broom texture.
- 3.2.3.5.4.** Obtain approval of finish texture by Architect for various applications.
- 3.2.3.6.** Miscellaneous Finish:
 - 3.2.3.6.1.** Float and steel trowel surface to required slopes and planes.
 - 3.2.3.6.2.** At areas within pedestrian traffic paths, apply very light uniform sack or float finish texture, sufficient to remove surface paste. Do not expose aggregate.
 - 3.2.3.6.3.** Obtain approval of finish texture by Architect.

3.3. JOINT TREATMENT

- 3.3.1.** Provide expansion joints at locations shown on drawings, and as follows:
 - 3.3.1.1.** Beginning and end of curves in curbs and curbs and gutter assemblies, and at 60 feet on center.
 - 3.3.1.2.** Where paving is adjacent to walls, bollard or column penetrations, or footings.
 - 3.3.1.3.** At pavement plazas and fields, approximately 20 feet on center each way, and as necessary to limit area to a maximum of 400 square feet.
 - 3.3.1.4.** At 25 feet on center in linear walkways.
 - 3.3.1.5.** Tool all edges adjacent to expansion material with maximum 1/8 inch radius tool.
 - 3.3.1.6.** Remove joint cap. Provide bondbreaker tape at surface of joint material cover cap.
 - 3.3.1.7.** Provide sealant and backer rod assembly per Section 07 90 00 and as shown on drawings.
 - 3.3.1.8.** Provide construction joints only at expansion joints.
- 3.3.2.** Provide control (weakened plane) joints at locations shown on drawings, and as follows:
 - 3.3.2.1.** At curbs, curb and gutter assemblies, and cross gutters at 20 feet on center maximum. Where concrete pavement occurs adjacent to curb, align curb and pavement joints.

- 3.3.2.2.** At pavement plazas and fields, approximately 10 feet on center each way, and as necessary to limit area to a maximum of 100 square feet.
- 3.3.2.3.** At pavement areas at all re-entrant corners and at changes in direction.
- 3.3.2.4.** Provide control (weakened plane) joints by saw cutting method, hand held jointing tools, or by use of SOF-CUT equipment. Use of zip-strip not acceptable.
- 3.3.2.5.** Provide maximum 1/8 inch edge radius at all joints. Where saw-cut joint technique selected, grind cut edge to create 1/8 inch beveled edge.
- 3.3.2.6.** Extend control joints a minimum of 1-1/4 inch below surface, or 1/4 the thickness of the curb or pavement, whichever is greatest. Provide hand-cutters, tooled joints or other approved tools for conditions where equipment cannot continue cutting to outside edge.
- 3.3.2.7.** Schedule cutting control joints as necessary to avoid raveling edge, but as necessary to avoid shrinkage cracking of pavement.

3.4. CONCRETE CURING AND SEALING

3.4.1. General:

- 3.4.1.1.** Cure natural colored concrete with specified compound. Do not permit overspray onto color hardened concrete.
- 3.4.1.2.** Provide wind barriers and other screening as necessary to avoid rapid drying.

3.4.2. Alternate Method:

- 3.4.2.1.** All natural colored slabs may be water cured by means of fine mist spray. Maintain in damp condition for a period of seven (7) days after pouring.

3.5. FIELD QUALITY CONTROL

3.5.1. Flood Test:

- 3.5.1.1.** Provide flood test of all gutters and paving as directed by Architect.
- 3.5.1.2.** Where ponding occurs, or where drainage rate is less than that established by original design, replace all defective concrete. Remove concrete to the nearest joint line.

3.5.2. Tolerances:

- 3.5.2.1.** Level: 3/16 inch plus or minus, at any point, measured along a 10 foot straight edge.
- 3.5.2.2.** Adjacent surfaces: 1/8 inch maximum difference at any point between adjacent concrete pours or between paving and adjacent paving materials.
- 3.5.2.3.** Joint Alignment: 1/16 inch deviation from adjacent joint.
- 3.5.2.4.** Line: 1/4 inch, plus or minus, deviation from a straight line in any 10 foot length, non-cumulative.

3.5.2.5. Final elevations shall comply with grades as shown on drawings, to a tolerance of plus or minus 0.25 inch.

3.5.2.6. Tolerances do not permit violation of dimensions or grade and slopes relationships required by code or jurisdictional authority. Adjust work as required to comply with such requirements.

3.5.3. Appearance:

3.5.3.1. Remove and replace concrete not matching approved mock-up, concrete not complying with specified tolerances, and concrete with the following defects.

3.5.3.1.1. Inconsistent texture.

3.5.3.1.2. Irregular or misaligned direction of texture.

3.5.3.1.3. Concrete with spalled or raveled control or expansion joints.

3.5.3.1.4. Concrete exhibiting splotching or discoloration in surface including discoloration due to "carbonation".

3.5.3.1.5. Concrete exhibiting cracking, including shrinkage cracking, where cracks are located between joint pattern.

3.5.3.2. Use of patching mortar for repair of edge defects is subject to acceptance of final color and texture by Architect. Use of patching mortar not acceptable for repair of defective exposed aggregate finished concrete.

END OF SECTION