Solicitation 1705-166

Williamson County Jail Kitchen & Plumbing Remodel

Bid Designation: Public

Williamson County, Texas

Bid 1705-166
Williamson County Jail Kitchen & Plumbing Remodel

Bid Number	1705-166
Bid Title	Williamson County Jail Kitchen & Plumbing Remodel
Expected Expenditure	**$2,000,000.00** (This price is expected - not guaranteed)
Bid Start Date	In Held
Bid End Date	Jul 6, 2017 3:00:00 PM CDT
Question & Answer End Date	Jun 30, 2017 5:00:00 PM CDT
Bid Contact	Blake Skiles Purchasing Specialist III 512-**943**-1478 blake.skiles@wilco.org
Contract Duration	**150 days**
Contract Renewal	Not Applicable
Prices Good for	**365 days**
Pre-Bid Conference	**Jun 21, 2017 10:00:00 AM CDT** **Attendance is mandatory** **Location: 508 South Rock Street** **Georgetown, TX 78626**
Bid Comments	**Williamson County is seeking proposals from qualified companies to provide remodeling services for the Williamson County Jail. This project will consist of re-working the HVAC, walk-in refrigeration units and some drainage in the Jail Kitchen as well as some added HVAC at two other locations on the ground floor of the Jail Building. Another component of the project is the installation of an epoxy liner at accessible areas of the copper water supply lines in certain portions of the Jail. The Jail Kitchen will be shut-down before work begins in the Kitchen area and a temporary kitchen will be provided by the County. 5% Bid Bond Required.**

Item Response Form

Item	**1705-166--01-01 -** Total Proposal Price
Quantity	**1 each**
Unit Price	
Delivery Location	**Williamson County, Texas** No Location Specified

Qty 1

Description
Total Proposal Price

Item	**1705-166--01-02 -** Please Attach All Documents To This Line

Quantity **1 each**

Prices are not requested for this item.

Delivery Location **Williamson County, Texas**

No Location Specified

Qty 1

Description

Please Attach All Documents To This Line.

Please DO NOT Attach .zip Files!

PUBLIC ANNOUNCEMENT AND GENERAL INFORMATION

WILLIAMSON COUNTY PURCHASING DEPARTMENT
SOLICITATION 1705-166
Williamson County Jail Kitchen & Plumbing Remodel

PROPOSALS MUST BE RECEIVED ON OR BEFORE:
Jul 6, 2017 3:00:00 PM CDT

PROPOSAL WILL BE PUBLICLY OPENED:
Jul 6, 2017 3:00:00 PM CDT

Notice is hereby given that sealed Proposals for the above-mentioned goods and/or services will be accepted by the Williamson County Purchasing Department. Williamson County uses BidSync to distribute and receive proposals. Specifications for this RFP may be obtained by registering at www.bidsync.com.

Williamson County prefers and requests electronic submittal of this Proposal.
All electronic proposal must be submitted via: www.bidsync.com

Electronic proposals are requested, however paper proposals will currently still be received, until further notice and may be mailed or delivered to the address listed below.

Respondents are strongly encouraged to carefully read this entire RFP.

All interested Respondents are invited to submit a Proposal in accordance with the Instructions and General Requirements, Proposal Format, Proposal Specifications, and Definitions, Terms and Conditions stated in this RFP.

Please note that a complete package must be submitted choosing one of the above two methods. Split packages submitted will be considered "unresponsive" and will not be accepted or evaluated.

Williamson County will not accept any Proposals received after the submittal deadline, and shall return such Proposals unopened to the Respondent.

General Information:

- If mailed or delivered in person, Proposal and Proposal addenda are to be delivered in sealed envelope on or before the submittal deadline, as noted in the Public Announcement and General Information listed above for this RFP, to:

  Williamson County Purchasing Department
  Attn: **PROPOSAL NAME AND NUMBER**
  901 South Austin Avenue
  Georgetown, Texas 78626

  - Respondents should list the Proposal Number, Proposal Name, Name and Address of Respondent, and the Date of the Proposal opening on the outside of the box or envelope and note "Sealed Proposal Enclosed."
  - Respondent should submit one (1) original.
  - Williamson County will NOT be responsible for unmarked or improperly marked envelopes.
  - Williamson County will not accept any responsibility for Proposals being delivered by third party carriers.
  - Facsimile transmittals will NOT be accepted.

- Proposals will be opened publicly in a manner; however, to avoid public disclosure of contents, only the names of Respondents and pricing will be read aloud.

- All submitted questions with their answers will be posted and updated on www.bidsync.com.

- It is the Respondent's responsibility to review all documents in BidSync, including any Addenda that may have been added after the document packet was originally released and posted.

  - Any Addenda and/or other information relevant to the RFP will be posted on www.bidsync.com.

  - The Williamson County Purchasing Department takes no responsibility to ensure any interested Respondent has obtained any outstanding addenda or additional information.

Williamson County – Request for Proposal (RFP)

SECTION 1 - DEFINITIONS

Addendum/Addenda – means any written or graphic instruments issued by the County prior to the consideration of Proposals which modify or interpret the Proposal Documents by additions, deletions, clarifications, or corrections.

Agreement/Ensuing Agreement(s) – means the Successful Respondent may be required by the County to sign an additional Agreement containing terms necessary to ensure compliance with the RFP and the Respondent's Proposal. Such Ensuing Agreement(s) shall contain the Proposal specifications, terms and conditions that are derived from the RFP.

Contract – means this RFP and the Proposal of the Successful Respondent shall become a Contract between the Successful Respondent and the County once the Successful Respondent's Proposal is properly accepted by the Williamson County Commissioners Court (sometimes referred to herein as the Commissioner's Court").

Commissioner's Court – means the Williamson County Commissioners Court.

County – means Williamson County, a political subdivision of the State of Texas.

Executive Summary – means the document submitted by Respondent that represents a concise summary of the contents of the Proposal. It does not include any information concerning costs.

Proposal Documents – means the Legal Notice, RFP including attachments, and any Addenda issued by the County prior to the consideration of any Proposals.

Proposal – means the complete, properly signed document, and ALL required forms and documentation listed in the proposal package which have been submitted in accordance with this RFP package. A Proposal submitted in accordance with this RFP is irrevocable during the specified time period for evaluation and acceptance of Proposals, unless a waiver is obtained from the Williamson County Purchasing Agent.

Respondent – means a person or entity who submits a Proposal in response to this RFP.

Request for Proposals (RFP) – means this document, together with the attachments thereto and any future Addenda issued by the County.

Successful Respondent– means the responsible Respondent who, in the County's sole opinion, submits the Proposal which is in the best interest of the County, taking into account factors identified

herein, and to whom the County intends to award the Contract.

SECTION 2 - RESPONSE FORMAT AND SUBMISSION

2.1 INTRODUCTION

Each Proposal submitted in response to this RFP should clearly reference the numbered sections of this RFP that require a response. Failure to arrange the Proposal as requested may result in the disqualification of the Proposal.

Though there is not a page limit for Proposals, to save natural resources including paper, and to allow the County staff to efficiently evaluate all submitted Proposals, the County requests that Proposals be orderly, concise, but comprehensive in providing the requested information. Conciseness and clarity of content are emphasized and encouraged. If mailed or delivered in person, please limit additional, non requested information.

Please provide your Proposal response using:

A. 8 ½" x 11" pages, inclusive of any cover letter or supporting materials.

B. The least amount of plastic/laminate or other non-recyclable binding materials.

C. Single-sided printing.

Vague and general Proposals will be considered non-responsive, and may, at the County's sole discretion, result in disqualification. Proposals must be legible and complete. Failure to provide the required information may result in the disqualification of the Proposal. All pages of the Proposal should be numbered and the Proposal should contain an organized, paginated table of contents corresponding to the sections and pages of the Proposal.

2.2 ORGANIZATION OF PROPOSAL CONTENTS AND TABLE OF CONTENTS

Each Proposal should be submitted with a table of contents that clearly identifies and denotes the location of all enclosures of the Proposal. The table of contents should follow the RFP's structure as much as is practical.

Each Proposal should be organized in the manner described below:

A. Transmittal Letter. Please see Section 2.3, Transmittal Letter, for more information.

B. Table of Contents.

C. Executive Summary. Please see Section 2.4, Executive Summary.

D. Proposal Response to Criteria. (Please see the sections in this RFP package that list the Specifications & Cost Proposal, Experience and Qualifications, References, and Implementation Strategy to respond to our criteria in a clear and concise manner)

E. Price Sheet.

F. References: Identification of three (3) references within the last four (4) years, for which the Respondent is providing, or has provided, the goods and/or services (public sector) of the type requested in this RFP. Include the name, position/title, and telephone number of a contact person at each entity.

G. Conflict of Interest Questionnaire.

H. Proposal Affidavit (Signature Page).

I. Attach your entities sample Contract, if applicable, for the County's review and consideration. This should include any additional terms or conditions. The County is not required to use the sample Contract submitted.

2.3 TRANSMITTAL LETTER

The Respondent should submit a Transmittal Letter that provides the following information:

A. Name and address of individual or business entity submitting the Proposal.

B. Respondent's type of business entity (i.e., Corporation, General Partnership, Limited Partnership, LLC, etc.). See Section 3.5, Signature of Respondent, for more information.

C. Place of incorporation or organization, if applicable.

D. Name and location of major offices and other facilities that relate to the Respondent performance under the terms of this RFP.

E. Name, physical address, email address, business and fax number of the Respondent's principal contact person regarding all contractual matters relating to this RFP.

F. The Respondent's Federal Employer Identification Number.

G. A commitment by the Respondent to provide the services required by the County;

H. A statement that the Proposal is valid for the time specified on page three (3), under the section named *Prices Good for*, of this Proposal packet. Any Proposal containing a term of less than the required amount, may at the County's sole discretion, be rejected as non-responsive.

I. If the Proposal being submitted will have an effect on air quality for the County (as it relates to any state, federal, or voluntary air quality standard), then the Respondent is encouraged to provide information in narrative indicating the anticipated air quality impact. See Section 4.40, Air Quality for more information.

The Transmittal Letter should be signed by a person legally authorized to bind the Respondent to the representations in the Transmittal Letter and the Proposal. In the case of a joint Proposal, each party must sign the Transmittal Letter.

2.4 EXECUTIVE SUMMARY

The Respondent should provide an Executive Summary of its Proposal that asserts that the Respondent is providing in its response all of the requirements of this RFP. The Executive Summary should not include any information concerning the cost of the Proposal, but instead must represent a full and concise summary of the contents of the Proposal. It is recommended the Executive Summary include the following information:

A. Identify any goods and/or services that are provided beyond those specifically requested. If the Respondent is providing services and/or goods that do not meet the specific requirements of this RFP, but in the opinion of the Respondent are equivalent or superior to those specifically requested, any such differences should be noted in the Executive Summary. However, the Respondent must realize that failure to provide the goods and/or services specifically required, at the County's sole discretion, may result in disqualification of the Proposal.

B. Indicate why the Respondent believes that it is the most qualified Respondent to provide the services described in this RFP. The Successful Respondent must demonstrate extensive experience and understanding of the intent of this project. The Respondent should describe in detail the current and historical experience the Respondent and its subcontractors have that would be relevant to completing the project. References must contain the name of key personnel and telephone numbers for each contact, as described in Section 3.14, References.

C. Briefly state why the Respondent believes its proposed goods and/or services best meet the County's needs and RFP requirements, and the Respondent also should concisely describe any additional features, aspects, or advantages of its goods and/or services in any relevant area not covered elsewhere in its Proposal.

2.5 CONFLICT OF INTEREST

No public official shall have interest in a contract, in accordance with Vernon's Texas Codes Annotated, Local Government Code, Title 5, Subtitle C, Chapter 171, as amended.

As of January 1, 2006, all Respondents are responsible for complying with Local Government Code, Title 5, Subtitle C, Chapter 176. Additional information may be obtained from the County's website at the following link:

http://www.wilco.org/CountyDepartments/Purchasing/ConflictofInterestDisclosure/tabid/689/language/en-US/Default.aspx

Each Respondent must disclose any existing or potential conflict of interest relative to the performance of the requirements of this RFP. **Examples of potential conflicts of interest may include an existing business or personal relationship between the Respondent, its principal, or any affiliate or subcontractor with the County or any other entity or person involved in any way with the project that is subject to this RFP**. Similarly, any personal or business relationship between the Respondent, the principals, or any affiliate or subcontractor with any employee, or official of the County or its suppliers must be disclosed. Any such relationship that might be perceived or represented as a conflict must be disclosed. Failure to disclose any such relationship or reveal personal relationships with the County employees or officials may be cause for termination.

The County will decide if an actual or perceived conflict should result in Proposal disqualification.

By submitting a Proposal in response to this RFP, all Respondents affirm they have not given, nor intend to give, at any time hereafter, any economic opportunity, future employment, gift, loan, gratuity, special discount, trip, favor, or service to a the County public servant or any employee, official or representative of same, in connection with this procurement.

Each Respondent must provide a Conflict of Interest Statement with their Proposal Package. Package may be deemed incomplete without this form.

2.6 CERTIFICATE OF INTERESTED PARTIES – FORM 1295

As of January 1, 2016, all Respondents are responsible for complying with the Texas Government Code, Section 2252.908. The law states that the County may not enter into certain contracts with a Respondent unless the Respondent submits a disclosure of interested parties to the County at the time the Respondent submits the signed contract. The law applies only to a contract of the County on or after January 1, 2016 that either:

A. Requires an action or vote by the Commissioners Court before the contract may be signed (all contracts that fall under the jurisdiction of the Commissioners Court approval, such as contracts resulting from an Initiation for Bid (IFB), RFP, Request for Qualifications (RFQ), etc., excluding,

but not limited to, certain Juvenile Service contracts, contracts funded with Sheriff's seized fun monies, etc.); or

B. Has a value of at least $1,000,000.

By January 1, 2016, the Texas Ethics Commission will make available on its website, a new filing application that must be used to file Form 1295. Information regarding how to use the filing application is available on the Texas Ethics Commission website at the following link:

https://www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm

A Respondent must:

A. Use the online application to process the required information on Form 1295.

B. Print a copy of the form which will contain a unique certification number.

C. An authorized agent of the Respondent must sign the printed copy of the form.

D. Have the form notarized.

E. File the completed Form 1295 and certification of filing (scanning and emailing form is sufficient) with Williamson County Purchasing Agent at the time the signed Contract is submitted for approval.

After the Commissioners Court award of the contract, the County shall notify the Texas Ethics Commission, using the Texas Ethics Commission's filing application, of the receipt of the filed Form 1295 and certification of filing not later than the 30th day after the date the contract binds all parties to the contract. The Texas Ethics Commission will post the completed Form 1295 to its website within seven business days after receiving notice from the County.

2.7 PROPOSAL SUBMITTAL DEADLINE

The Proposal is due no later than the submittal date and time set forth in the Public Announcement and General Information listed in this RFP package. Contents of each Proposal shall be submitted in accordance with this RFP.

2.8 ETHICS

The Respondent shall not accept or offer gifts or anything of value, nor enter into any business arrangement with any employee, official or agent of the County.

2.9 DELIVERY OF PROPOSALS

The County uses BidSync to distribute and receive bids and Proposals. It is preferred that Proposals be submitted electronically through BidSync; however, Respondents can submit a hard copy.

Refer to www.bidsync.com for further information on how to submit electronically.

If mailed or delivered in person, Proposal and Proposal Addenda are to be delivered in sealed envelope on or before the submittal deadline, as noted in the Public Announcement and General Information listed in this RFP package, to:

Williamson County Purchasing Department

Attn: **Proposal Name and Number**
901 South Austin Avenue
Georgetown, Texas 78626

Also, all Respondents should list their Name and Address, and the Date of the Proposal opening on the outside of the box or envelope and note "Sealed Proposal Enclosed." Williamson County will not accept any Proposals after the submittal deadline, and shall return such Proposals unopened to the Respondent. The County will not accept any responsibility for Proposals being delivered by third party carriers.

Proposals will be opened publicly; however, in a manner to avoid public disclosure of contents, only names of Respondents will be read aloud: no pricing will be announced at the opening.

SECTION 3 - INSTRUCTIONS AND GENERAL REQUIREMENTS

3.1 INSTRUCTIONS

Read this document carefully, and follow all instructions and requirements. All Respondents are responsible for fulfilling all requirements and specifications. Be sure to have a clear understanding of this RFP.

General requirements apply to all advertised RFPs; however, these may be superseded, in whole or in part, by the proposal specifications, Addenda and modifications issued as a part of this RFP. Be sure your Proposal package is complete.

3.2 AMBIGUITY, CONFLICT, OR OTHER ERRORS IN THIS RFP

If a Respondent discovers any ambiguity, conflict, discrepancy, omission or other error in this RFP, the Respondent shall immediately notify the County Purchasing Department of such error in writing and request modification or clarification of the document.

Modifications will be made by issuing Addenda. If the Respondent fails to notify the County prior to the date and time fixed for submission of Proposals of an error or ambiguity in the RFP known to the Respondent, or an error or ambiguity that reasonably should have been known to the Respondent, then the Respondent shall be deemed to have waived the error or ambiguity or its later resolution.

The County may also modify the RFP, no later than forty-eight (48) hours prior to the date and time fixed for submission of Proposals, by issuance of an Addendum. All Addenda will be numbered consecutively, beginning with one (1).

3.3 NOTIFICATION OF MOST CURRENT ADDRESS

All Respondents in receipt of this RFP shall notify the Williamson County Purchasing Department of any address changes, contact person changes, and/or telephone number changes no later than forty-eight (48) hours prior to the date and time fixed for submission of Proposals.

3.4 SIGNATURE OF RESPONDENT

A Transmittal Letter, which shall be considered an integral part of the Proposal as stated in Section 2.3, Transmittal Letter, shall be signed by an individual who is authorized to bind the Respondent contractually.

A. If the Respondent is a Corporation or Limited Liability Company, the legal name of the Corporation or Limited Liability Company shall be provided together with the signature of the officer or officers authorized to sign on behalf of such entity.

B. If the Respondent is a General Partnership, the true name of the firm shall be provided with the signature of each partner authorized to sign.

C. If the Respondent is a Limited Partnership, the name of the Limited Partner's General Partner shall be provided with the signature of the officer authorized to sign on behalf of the General Partner.

D. If the Respondent is a Sole Proprietor(s) (individual), each Sole Proprietor(s) shall sign.

E. If signature is by an agent, other than the Sole Proprietor(s) or an officer of a Corporation, Limited

Liability Company, General Partner or a member of a General Partnership, a power of attorney equivalent document must be submitted to the Williamson County Purchasing Department.

3.5 ASSUMED BUSINESS NAME

If the Respondent operates business under an Assumed Business Name, the Respondent must have file with the Williamson County Clerk a current Assumed Name Certificate and provide a file marked copy of same prior to contract award.

3.6 ECONOMY OF PRESENTATION

Proposals should not contain promotional or display materials, except as they may directly answer in whole or in part questions contained in the RFP. Such exhibits shall be clearly marked with the applicable reference number of the question in the RFP. Proposals must address the technical requirements as specified in the RFP. All questions posed by the RFP must be answered concisely and clearly. Proposals that do not address each criterion may be, at the sole discretion of the County, rejected and not considered.

3.7 PROPOSAL OBLIGATION

The contents of the RFP, Proposal, and any clarification thereof submitted by the Successful Respondent shall become part of the contractual obligation and incorporated by reference into the Contract and any Ensuing Agreement(s).

3.8 COMPLIANCE WITH RFP SPECIFICATIONS

It is intended that this RFP describe the requirements and the Proposal format in sufficient detail to secure comparable Proposal. Failure to comply with all provisions of the RFP may, at the sole discretion of the County, result in disqualification.

3.9 EVALUATION

The County reserves the right to use all pertinent information (also learned from sources other than disclosed in the RFP process) that might affect the County's judgment as to the appropriateness of award to the best evaluated Respondent. This information may be appended to the Proposal evaluation process results. Information on a Respondent from reliable sources, and not within the Respondent Proposal, may also be noted and made part of the evaluation file. The County shall have sole discretion for determining the reliability of the source. The County reserves the right to conduct written and/or oral discussions/interviews after the Proposal opening. The purpose of such discussions/interviews is to provide clarification and/or additional information to make an award that is in the best interest of the County.

3.10 WITHDRAWAL OF PROPOSAL

The Respondent may withdraw its Proposal by submitting a written request with the company letterhead and the signature of an authorized individual, as described in Section 3.4, Signature of Respondent, to the Williamson County Purchasing Department any time prior to the submission deadline.

The Respondent may submit a new Proposal prior to the deadline. Alterations of the Proposal in any manner will not be considered if submitted after the deadline. Withdrawal of a Proposal after the deadline will be subject to written approval of the Williamson County Purchasing Agent.

3.11 RESPONSIBILITY

It is expected that a Respondent will be able to affirmatively demonstrate responsibility. A prospective Respondent should be able to meet the following requirements:

A. Have adequate financial resources, or the ability to obtain such resources as required;
B. Be able to comply with the required or proposed delivery schedule;
C. Have a satisfactory record of performance that can be determined thru references provided; and
D. Be otherwise qualified and eligible to receive an award.

The County may request representation and other information sufficient to determine the Respondent ability to meet these minimum standards listed above.

3.12 PURCHASE ORDERS

If required by the Williamson County Purchasing Department, a purchase order(s) may be generated to the Successful Respondent for goods and/or services. If a purchase order is issued, the purchase order number must appear on all itemized invoices and/or requests for payment.

3.13 SILENCE OF SPECIFICATIONS

The apparent silence of any RFP specifications as to any detail or to the apparent omission from it of a detailed description concerning any point, shall be regarded as meaning that only the best practices are to prevail. All interpretations of these specifications shall be made on the basis of this statement.

3.14 REFERENCES

Respondents shall furnish a list of contracts where similar responsibilities and goods and/or services have been required and/or performed for the past five (5) years, to include names, titles, phone numbers and email addresses of reference contacts, contract numbers and dates of performance.

Also, Respondents shall include a list of any contracts that have been cancelled or terminated within the last five (5) years, along with an explanation of the cancellation and the names, email address and phone number of a reference person with that institution.

The County may contact some or all of the references in order to determine the Respondent performance record on work similar to that described in this RFP. The County reserves the right to contact references other than those provided in the response and to use the information gained from them in the evaluation process.

References should be provided in accordance with this RFP. Proposal may not be deemed complete without the inclusion of requested references.

SECTION 4 - TERMS AND CONDITIONS

4.1 VENUE AND GOVERNING LAW

The Respondent hereby agrees and acknowledges that venue and jurisdiction of any suit, right, or cause of action arising out of or in connection with this RFP, the Contract and any Ensuing Agreement(s), shall lie exclusively in either Williamson County, Texas or in the Austin Division of the Western Federal District of Texas, and the parties hereto expressly consent and submit to such jurisdiction. Furthermore, except to the extent that this RFP, the Contract and any Ensuing Agreement(s) is governed by the laws of the United States, this RFP, the Contract and any Ensuing Agreement(s) shall be governed by and construed in accordance with the laws of the State of Texas, excluding, however, its choice of law rules.

4.2 INCORPORATION BY REFERENCE AND PRECEDENCE

A. The Contract shall be derived from the RFP and its Addenda (if applicable), and the Respondent Proposal. In the event of a dispute under the Contract, applicable documents will be referred to for the purpose of clarification or for additional detail in the following order of precedence:

   1. The RFP and its Addenda (if applicable); and

   2. The Respondent's Proposal.

B. In the event the County requires that an Ensuing Agreement be executed following award and a dispute arises between the terms and conditions of the Ensuing Agreement, the RFP and its Addenda (if applicable), and the Respondent's Proposal, applicable documents will be referred to for the purpose of clarification or for additional detail in the following order of precedence:

   1. The terms and conditions of the Ensuing Agreement;

   2. The RFP and its Addenda; and

   3. The Respondent's Proposal.

4.3 OWNERSHIP OF PROPOSAL

Each Proposal shall become the property of the County upon submittal and will not be returned to Respondents unless received after the submittal deadline.

4.4 DISQUALIFICATION OF RESPONDENT

Upon signing and submittal of the Proposal, a Respondent offering to sell supplies, materials, services, or equipment to the County, certifies that the Respondent has not violated the antitrust laws of the State of Texas codified in Business & Commerce Code, Section 15.01, or the Federal Antitrust Laws, and has not communicated directly or indirectly the offer made to any competitor or any other person engaged such line of business. Any or all Proposals may be rejected if the County believes that collusion exists among the Respondents.

4.5 FUNDING

The County intends to budget and make sufficient funds available and authorize funds for expenditure to finance the costs of the Contract. All Respondents understand and agree that the County's payment of

amounts under the Contract shall be contingent on the County receiving appropriations or other expenditure authority sufficient to allow the County, in the exercise of reasonable administrative discretion, to make payments under this Contract.

4.6 ASSIGNMENT, SUCCESSORS AND ASSIGNS

The Successful Respondent may not assign, sell, or otherwise transfer the Contract or any other rights or interests obtained under the Contract without written permission of the Williamson County the Commissioners Court. The Contract and any Ensuing Agreement(s) shall be binding upon and inure to the benefit of the contracting parties hereto and their respective successors and permitted assigns.

4.7 IMPLIED REQUIREMENTS

Products or services not specifically described or required in the RFP, but are necessary to provide the functional capabilities described by the Respondent, shall be implied and deemed to be included in the Proposal.

4.8 TERMINATION

A. **Termination for Cause:** The County reserves the right to terminate the Contract and/or any Ensuing Agreement(s) for default if the Successful Respondent breaches any of the Proposal specifications, terms and conditions, including warranties of the Respondent, if any, or if the Successful Respondent becomes insolvent or commits acts of bankruptcy. Such right of termination is in addition to and not in lieu of any other remedies the County may have at law or equity or as may otherwise be provided hereunder. Default may be construed as, but not limited to, failure to deliver the proper goods and/or services within the proper amount of time, and/or to properly perform any and all other requirements to the County's satisfaction, and/or to meet all other obligations and requirements.

B. **Termination for Convenience:** The County may terminate the Contract and/or any Ensuing Agreement(s) for convenience and without cause or further liability, upon no less than thirty (30) calendar days written notice to the Successful Respondent. The County reserves the right to extend this period if it is in the best interest of the County. In the event the County exercises its right to terminate without cause, it is understood and agreed that only the amounts due to the Successful Respondent for goods, commodities and/or services provided and expenses incurred to and including the date of termination, will be due and payable. No penalty will be assessed for the County's termination for convenience.

4.9 NON-PERFORMANCE

It is the objective of the County to obtain complete and satisfactory performance of the requirements set forth herein. In addition to any other remedies available at law, in equity or that may be set out herein, failure to perform may result in a deduction of payment equal to the amount of the goods and/or services that were not provided and/or performed to the County's satisfaction.

In the event of such non-performance, the County shall have the right, but shall not be obligated, to complete the services itself or by others and/or purchase the goods from other sources. If the County elects to acquire the goods or perform the services itself or by others, pursuant to the foregoing, the Successful Respondent shall reimburse the County, within ten (10) calendar days of demand, for all costs incurred by the County (including, without limitation, applicable, general, and administrative expenses, and field overhead, and the cost of necessary equipment, materials, and field labor) in correcting the nonperformance which the Successful Respondent fails to meet pursuant to the requirements set out herein. In the event the Successful Respondent refuses to reimburse the County as set out in this provision, the County shall have the right to deduct such reimbursement amounts from any amounts that may be then owing or that may become owing in the future to the Successful Respondent.

4.10 PROPRIETARY INFORMATION AND THE TEXAS PUBLIC INFORMATION ACT

All material submitted to the County shall become public property and subject to the Texas Public Information Act upon receipt. If a Respondent does not desire proprietary information in the Proposal to be disclosed, each page must be clearly identified and marked proprietary at time of submittal or, more preferably, all proprietary information may be placed in a folder or appendix and be clearly identified and marked as being proprietary. Failure to clearly identify and mark information as being proprietary as set forth under this provision will result in all unmarked information being deemed non-proprietary and available to the public. For all information that has not been clearly identified and marked as proprietary by the Respondent, the County may choose to place such information on the County's website and/or a similar public database without obtaining any type of prior consent from the Respondent.

The County will, to the extent allowed by law, endeavor to protect from public disclosure the information that has been identified and marked as proprietary. The final decision as to what information must be disclosed, however, lies with the Texas Attorney General.

To the extent, if any, that any provision in this RFP or in the Respondent's Proposal is in conflict with Texas Government Code, Chapter 552, as amended (the "Public Information Act"), the same shall be of no force or effect. Furthermore, it is expressly understood, and agreed, that the County, and its officers and employees, may request advice, decisions and opinions of the Attorney General of the State of Texas in regard to the application of the Public Information Act to any items or data furnished to the County as to whether or not the same are available to the public. It is further understood that that the County, and its officers and employees, shall have the right to rely on the advice, decisions and opinions of the Attorney General, and that the County, its officers and employees shall have no liability or obligation to any party hereto for the disclosure to the public, or to any person or persons, of any items or data furnished to the County by a party hereto, in reliance of any advice, decision or opinion of the Attorney General of the State of Texas.

4.11 RIGHT TO AUDIT

The Successful Respondent agrees that the County or its duly authorized representatives shall, until the expiration of three (3) years after termination or expiration of the services to be performed, have access to and the right to examine and photocopy any and all books, documents, papers and records of the Successful Respondent, which are directly pertinent to the services to be performed or goods to delivered for the purposes of making audits, examinations, excerpts and transcriptions. The Successful Respondent agrees that the County shall have access during normal working hours to all necessary facilities and shall be provided adequate and appropriate work space in order to conduct audits in compliance with the provisions of this section. The County shall give the Successful Respondent reasonable advance notice of intended audits.

4.12 TESTING AND INSPECTIONS

The County reserves the right to inspect and test equipment, supplies, materials and goods for quality and compliance with this RFP, and ability to meet the needs of the user. Demonstration units must be available for review. Should the goods or services fail to meet requirements and/or be unavailable for evaluation, the County can deem the Respondent to be in breach and terminate the Contract and/or any Ensuing Agreement(s).

4.13 PROPOSAL PREPARATION COSTS

The cost of developing Proposals is the sole responsibility of the Respondents and shall not be charged to the County. There is no expressed or implied obligation for the County to reimburse the Respondents for any expense incurred in preparing a Proposal in response to this RFP and the County will not reimburse the Respondents for such expenses.

4.14 INDEMNIFICATION

The Successful Respondent shall indemnify, defend and save harmless, the County, its officials, employees, agents and agent's employees from, and against, all claims, liability, and expenses including reasonable attorneys' fees, arising from activities of the Respondent, its agents, servants or employees, performed hereunder that result from the negligent act, error, or omission of the Respondent or any of the Respondent's agents, servants or employees, as well as all claims of loss or damage to the Respondent's and the County's property, equipment, and/or supplies.

Furthermore, the County, its officials, employees, agents and agents' employees shall not be liable for damages to the Successful Respondent arising from any act of any third party, including, but not limited to, theft. The Successful Respondent further agrees to indemnify, defend and save harmless, the County from its officials, employee, agents and agents' employees against all claims of whatever nature arising from any accident, injury, or damage whatsoever, caused to any person, or the property of any person, occurring in relation to the Successful Respondent's performance of any services requested hereunder during the term of the Contract and/or any Ensuing Agreement(s).

The Successful Respondent shall timely report all claims, demands, suits, actions, proceedings, liens or judgements to the County and shall, upon the receipt of any claim, demand, suit, action, proceeding, lien or judgement, not later than the fifteenth (15^{th}) day of each month; provide the County with a written report on each such matter, setting forth the status of each matter, the schedule or planned proceedings with respect to each matter and the cooperation or assistance, if any, of the County required by the Successful Respondent in the defense of each matter. The Successful Respondent's duty to defend, indemnify and hold the County harmless shall be absolute. It shall not abate or end by reason of the expiration or termination of the Contract and/or any Ensuing Agreement(s), unless otherwise agreed by the County in writing. The provisions of this section shall survive the termination of the Contract and shall remain in full force and effect with respect to all such matters no matter when they arise.

In the event of any dispute between the parties, as to whether a claim, demand, suit, action, proceeding, lien or judgement, that appears to have been caused by or appears to have arisen out of or in connection with acts or omissions of the County, the Respondent shall nevertheless fully defend such claim, demand, suit or action, proceeding, lien or judgement, until and unless there is a determination by a court of competent jurisdiction that the acts and omissions of the Respondent are not an issue in the matter.

The Successful Respondent's indemnification shall cover, and the Successful Respondent agrees to, indemnify the County, in the event the County is found to have been negligent for having selected the Successful Respondent to perform the work described in this request. The provision by the Successful Respondent of insurance shall not limit the liability of the Successful Respondent under the Contract and/or any Ensuing Agreement(s).

4.15 WAIVER OF SUBROGATION

The Successful Respondent and the Successful Respondent's insurance carrier waive any and all rights whatsoever with regard to subrogation against the County as an indirect party to any suit arising out of personal or property damages resulting from the Respondent's performance under this Contract and any Ensuing Agreement(s).

4.16 RELATIONSHIP OF THE PARTIES

The Successful Respondent shall be an independent contractor and shall assume all of the rights, obligations, liabilities, applicable to it as such independent contractor hereunder and any provisions herein which may appear to give the County the right to direct the Successful Respondent as to details of doing work herein covered, or to exercise a measure of control over the work, shall be deemed to mean that the Successful Respondent shall follow the desires of the County in the results of the work only. The County shall not retain or have the right to control the Successful Respondent's means, methods or

details pertaining to the Successful Respondent's performance of the work. The County and the Successful Respondent hereby agree and declare that the Successful Respondent is an independent contractor and as such meets the qualifications of an "Independent Contractor" under Texas Workers Compensation Act, Texas Labor Code, Section 406.141, that the Successful Respondent is not an employee of the County, and that the Successful Respondent and its employees, agents and subcontractors shall not be entitled to workers compensation coverage or any other type of insurance coverage held by the County.

4.17 SOLE PROVIDER

The Successful Respondent agrees and acknowledges that it shall not be considered a sole provider of the goods and/or services described herein and that the County may contract with other providers of such goods and/or services if the County deems, at its sole discretion, that multiple providers of the same goods and/or services will serve the best interest of the County.

4.18 FORCE MAJEURE

If the party obligated to perform is prevented from performance by an act of war, order of legal authority, act of God, or other unavoidable cause not attributable to the fault or negligence of said party, the other party shall grant such party relief from the performance. The burden of proof for the need of such relief shall rest upon the party obligated to perform. To obtain release based on force majeure, the party obligated to perform shall file a written request with the other party.

4.19 SEVERABILITY

If any provision of this RFP, the Contract or any Ensuing Agreement(s) shall be held invalid or unenforceable by any court of competent jurisdiction, such holding shall not invalidate or render unenforceable any other provision thereof, but rather the entire RFP, Contract or any Ensuing Agreement (s) will be construed as if not containing the particular invalid or unenforceable provision or provisions, and the rights and obligation of the parties shall be construed and enforced in accordance therewith. The parties acknowledge that if any provision of this RFP, the Contract or any Ensuing Agreement(s) is determined to be invalid or unenforceable, it is the desire and intention of each that such provision be reformed and construed in such a manner that it will, to the maximum extent practicable, give effect to the intent of this RFP, the Contract or any Ensuing Agreement(s) and be deemed to be validated and enforceable.

4.20 EQUAL OPPORTUNITY

Neither party shall discriminate against any employee or applicant for employment because of race, color, sex, religion or national origin.

4.21 NOTICE

Any notice to be given shall be in writing and may be distributed by personal delivery, or by registered or certified mail, return receipt requested, addressed to the proper party, at the following address:

The County: Williamson County Purchasing Department
Attn: Purchasing Agent
901 South Austin Avenue
Georgetown, Texas 78626

The Respondent: Address set out in Respondent's Transmittal Letter

Notices given in accordance with this provision shall be effective upon (1) receipt by the party to which notice is given, or (2) on the third (3rd) calendar day following mailing, whichever occurs first.

4.22 SALES AND USE TAX EXEMPTION

The County is a body, corporate and politic, under the laws of the State of Texas and claims exemption from sales and use taxes under Texas Tax Code, Section 151.309, as amended, and the services and/or goods subject hereof are being secured for use by the County.

4.23 COMPLIANCE WITH LAWS

The County and the Successful Respondent shall comply with all federal, state, and local laws, statutes, ordinances, rules and regulations, and the orders and decrees of any courts or administrative bodies or tribunals in any matter affecting the performance of the Contract and any Ensuing Agreement(s), including, without limitation, Workers' Compensation laws, salary and wage statutes and regulations, licensing laws and regulations. When required, the Successful Respondent shall furnish the County with certification of compliance with said laws, statues, ordinances, rules, regulations, orders, and decrees above specified.

4.24 INCORPORATION OF EXHIBITS, APPENDICES AND ATTACHMENTS

All of the Exhibits, Appendices and Attachments referred to herein are incorporated by reference as if set forth verbatim herein. Any conflicting terms in the Contract documents will be resolved at the sole discretion of the Commissioners Court.

4.25 NO WAIVER OF IMMUNITIES

Nothing herein shall be deemed to waive, modify or amend any legal defense available at law or in equity to the County, its past or present officers, employees, or agents, nor to create any legal rights or claim on behalf of any third party. The County does not waive, modify, or alter to any extent whatsoever the availability of the defense of governmental immunity under the laws of the State of Texas and of the United States.

4.26 NO WAIVER

The failure or delay of any party to enforce at any time or any period of time any of the provisions of this RFP, the Contract or any Ensuing Agreement(s) shall not constitute a present or future waiver of such provisions nor the right of either party to enforce each and every provision. Furthermore, no term or provision hereof shall be deemed waived and no breach excused unless such waiver or consent shall be in writing and signed by the party claimed to have waived or consented. Any consent by any party to, or waiver of, a breach by the other, whether expressed or implied, shall not constitute a consent to, waiver of or excuse for any other, different or subsequent breach.

4.27 CURRENT REVENUES

The obligations of the parties under the Contract and any Ensuing Agreement(s) do not constitute a general obligation or indebtedness of the County for which the County is obligated to levy, pledge, or collect any of taxation. It is understood and agreed that the County shall have the right to terminate the Contract and any Ensuing Agreement(s) at the end of any the County fiscal year if the governing body of the County does not appropriate sufficient funds as determined by the County's budget for the fiscal year in question. The County may effect such termination by giving written notice of termination to t Successful Respondent at the end of its then-current fiscal year.

4.28 BINDING EFFECT

This Contract and any Ensuing Agreement(s) shall be binding upon and inure to the benefit of the parties and their respective permitted assigns and successors.

4.29 ASSIGNMENT

The Successful Respondent's interest and duties hereunder may not be assigned or delegated to a third party without the express written consent of the County.

4.30 SAFETY

The Successful Respondent is responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with any services to be provided hereunder. The safety program shall comply with all applicable requirements of the current federal Occupational Safety and Health Act and all other applicable federal, state and local laws and regulations.

4.31 GENERAL OBLIGATIONS AND RELIANCE

The Successful Respondent shall perform all services and/or provide all goods, as well as those reasonably inferable and necessary for completion and provision of services and/or goods required hereunder. The Successful Respondent shall keep the County informed of the progress and quality the services. The Successful Respondent agrees and acknowledges that the County is relying on the Successful Respondent's represented expertise and ability to provide the goods and/or services described herein. The Successful Respondent agrees to use its best efforts, skill, judgment, and abilities to perform its obligations in accordance with the highest standards used in the profession and to further the interests of the County in accordance with the County's requirements and procedures. The Successful Respondent's duties, as set forth herein, shall at no time be in any way diminished by reason of any approval by the County, nor shall the Successful Respondent be released from any liability reason of such approval by the County, it being understood that the County at all times is ultimately relying upon the Successful Respondent's skill and knowledge in performing the services and providing any goods required hereunder.

4.32 CONTRACTUAL DEVELOPMENT

The Commissioners Court may award the Contract on the basis of the initial Proposals received, without any further or additional discussions. Therefore, each initial Proposal should contain the Respondent best terms and offer. The contents of the RFP and the selected Proposal will become an integral part of the Contract, but may be modified, at Williamson County's sole discretion, by provisions of an Ensuing Agreement. Therefore, the Respondent must agree to inclusion in an Ensuing Agreement of t Proposal specifications, terms and conditions of this RFP. Williamson County may, at its discretion, opt to conduct further discussions with responsible offerors and request the highest ranked firm's Best and Final Offer (BAFO).

4.33 ENTIRE AGREEMENT

The Contract and any Ensuing Agreement(s) shall supersede all prior Agreements, written or oral between the Successful Respondent and the County and shall constitute the entire Agreement and understanding between the parties with respect to the services and/or goods to be provided. Each of the provisions herein shall be binding upon the parties and may not be waived, modified, amended or altered, except by writing signed by the Successful Respondent and the County.

4.34 SURVIVABILITY

All applicable agreements that were entered into between the Successful Respondent and the County, under the terms and conditions of the Contract and/or any Ensuing Agreement(s), shall survive the expiration or termination thereof for ninety (90) days unless a new contract has been awarded.

The County may exercise, by written notice to the Successful Respondent no later than ten (10) calendar days of the Contract expiration, this clause for emergency cases only.

4.35 PAYMENT

The County's payment for goods and services shall be governed by the Texas Government Code, Chapter 2251. An invoice shall be deemed overdue the thirty-first (31st) day after the later of the following:

A. The date the County receives the goods under the Contract;
B. The date the performance of the service under the Contract is completed; or
C. The date the Williamson County Auditor receives an invoice for the goods or services.

Interest charges for any overdue payments shall be paid by the County in accordance with Texas Government Code, Section 2251.025. More specifically, the rate of interest that shall accrue on a late payment is the rate in effect on September 1 of the County's fiscal year in which the payment becomes due. The said rate in effect on September 1 shall be equal to the sum of one (1) percent and the prime rate published in the Wall Street Journal on the first (1st) day of July of the preceding fiscal year that does not fall on a Saturday or Sunday.

In the event that an error appears in an invoice submitted by the Successful Respondent, the County shall notify the Successful Respondent of the error not later than the twenty-first (21st) day after the date the County receives the invoice. If the error is resolved in favor of the Successful Respondent, the Successful Respondent shall be entitled to receive interest on the unpaid balance of the invoice submitted by the Successful Respondent beginning on the date that the payment for the invoice became overdue. If the error is resolved in favor of the County, the Successful Respondent shall submit a corrected invoice that must be paid in accordance within the time set forth above. The unpaid balance accrues interest as provided by the Texas Government Code, Chapter 2251, if the corrected invoice is not paid by the appropriate date.

As a minimum, invoices shall include:

A. Name, address, and telephone number of the Successful Respondent and similar information in the event the payment is to be made to a different address.

B. The County Contract, Purchase Order.

C. Identification of items or service as outlined in the Contract.

D. Quantity or quantities, applicable unit prices, total prices and total amount.

E. Any additional payment information which may be called for by the Contract.

Payment inquiries should be directed to the following address:

Williamson County Auditor's Office, Accounts Payable Department
Email: accountspayable@wilco.org
Phone: 512-943-1500

4.36 CONTRACTUAL FORMATION AND ENSUING AGREEMENT

The RFP and the Respondent's Proposal, when properly accepted by the Commissioners Court, shall constitute a Contract equally binding between the Successful Respondent and the County. The Successful Respondent may be required by Williamson County to sign an additional Agreement containing terms necessary to ensure compliance with the RFP and Respondent's Proposal.

4.37 LEGAL LIABILITY INFORMATION

The Successful Respondent shall disclose all legal liability information by listing any pending litigation anticipated litigation that your firm is involved in including, but not limited to, potential or actual legal matters with private parties and any local, state, federal or international governmental entities. The County reserves the right to consider legal liability information in the recommendation of any proposed contract to the Commissioners Court.

4.38 CONFIDENTIALITY

Respondent expressly agrees that it will not use any direct or incidental confidential information that may be obtained while working in a governmental setting for its own benefit, and agrees that it will not access unauthorized areas or confidential information and it will not disclose any information to unauthorized third parties, and will take care to guard the security of the information at all times.

4.39 INCLEMENT WEATHER

In case of inclement weather or any other unforeseen event causing the County to close for business on the date of a Proposal submission deadline, the Proposal closing will automatically be postponed until the next business day the County is open. If inclement weather conditions or any other unforeseen event causes delays in carrier service operations, the County may issue an Addendum to all known Respondents interested in the project to extend the deadline. It will be the responsibility of the Respondent to notify the County of their interest in the project if these conditions are impacting their ability to turn in a submission within the stated deadline. The County reserves the right to make the final judgement call to extend any deadline.

4.40 AIR QUALITY

In determining the overall best Proposal, the County may, to the extent applicable, exercise the option granted to local governments under the Texas Local Government Code, Section 271.907.

This option allows the County to evaluate Proposals and give preference to goods and/or services of Respondent that demonstrates that the Respondent meets or exceeds any and all state or federal environmental standards, including voluntary standards, relating to air quality. If the Proposal being submitted will have an effect on air quality for the County (as it relates to any state, federal, or voluntary air quality standard), then the Respondent is encouraged to provide information in narrative indicating the anticipated air quality impact. All Respondents are expected to meet all mandated state and federal air quality standards.

4.41 COOPERATIVE PURCHASING PROGRAM

During the term of the Contract resulting from this RFP, the County would like to afford the same prices, terms and conditions to other political subdivisions or public entities. Another entity's participation in the Contract resulting from this RFP is subject to a properly authorized Purchasing Cooperative Inter-local Agreement (ILA) with the County. Any liability created by purchase orders issued against the Contract shall be the sole responsibility of the governmental agency placing the order.

4.42 PREVAILING WAGE RATES

To the extent this procurement is for the construction of a public work, including a building, highway, road, excavation, and repair work or other project development or improvement, paid for in whole or in part from public funds, without regard to whether the work is done under public supervision or direction, Texas Government Code, Chapter 2258, shall apply and the contractor shall pay not less than the wage scale of the various classes of labor as shown on the "Prevailing Wage Schedule" provided by the County. Pursuant to Texas Government Code, Section 2258.022(a)(2), the County has determined the general prevailing rate of the "Prevailing Wage Schedule" in the locality in which the public work is to be performed for each craft or type of worker needed to execute the contract and the prevailing rate for legal holiday and overtime work by using the prevailing wage rate as determined by the United States

Department of Labor in accordance with the United States Code, Section 276a (Davis-Bacon Act).

The specified wage rates are minimum rates only, and are not representations that qualified labor adequate to perform the work is available locally at the prevailing wage rates. The County is not bound to pay—and will not consider—any claims for additional compensation made by any contractor because the contractor pays wages in excess of the applicable minimum rate contained in the Contract Documents. The "Prevailing Wage Schedule" is not a representation that quantities of qualified labor adequate to perform the work may be found locally at the specified wage rates.

For classifications not shown, workers shall not be paid less than the wage indicated for laborers. The contractor shall notify each worker commencing work on the project the worker's job classification and the established minimum wage rate required to be paid, as well as the actual amount being paid. The notice must be delivered to and signed in acknowledgement of receipt by the employee and must list both the monetary wages and fringe benefits to be paid or furnished for each classification in which the worker is assigned duties. When requested by the County, competent evidence of compliance with the Texas Prevailing Wage Law shall be furnished by contractor. A copy of each worker wage rate notification shall be submitted to the County with the Application for Payment for the period during which the worker began on-site activities.

Should the contractor at any time become aware that a particular skill or trade not reflected on the County's "Prevailing Wage Schedule" will be or is being employed in the work, whether by the contractor or by a subcontractor, the contractor shall promptly inform the County and shall specify a wage rate for that skill or trade, which shall bind the contractor.

The contractor and any subcontractor shall pay to the County a penalty of sixty dollars ($60.00) for each worker employed for each calendar day, or portion thereof, that the worker is paid less than the wage rates stipulated in the "Prevailing Wage Schedule" or any supplement thereto. The contractor and each subcontractor shall keep, or cause to be kept, an accurate record showing the names and occupations of all workers employed in connection with the work, and showing the actual per diem wages paid to each worker, which records shall be open at all reasonable hours for the inspection by the County.

Within thirty-one (31) days of receipt of information concerning a violation of the Texas Government Code Chapter 2258, the County shall make an initial determination as to whether good cause exists to believe a violation occurred. The County's decision on the initial determination shall be reduced to writing and sent to the contractor or subcontractor against whom the violation was alleged, and to the affected worker. When a good cause finding is made, the County shall retain the full amounts claimed by the claimant or claimants as the difference between wages paid and wages due under the "Prevailing Wage Schedule" and any supplements thereto, together with the applicable penalties, such amounts being subtracted from successive progress payments pending a final decision on the violation.

After the County makes its initial determination, the affected contractor or subcontractor and worker have fourteen (14) calendar days in which to resolve the issue of whether a violation occurred, including the amount that should be retained by the County or paid to the affected worker. If the contractor or subcontractor and affected worker reach an agreement concerning the worker's claim, the contractor shall promptly notify the County in a written document signed by the worker. It the contractor or Subcontractor and affected worker do not agree before the fifteenth (15th) calendar day after the County determination, the contractor or subcontractor and affected worker must participate in binding arbitration in accordance with the Texas General Arbitration Act, Chapter 171, (Texas Civil Practice and Remedies Code). The parties to the arbitration have ten (10) calendar days after the expiration of the fifteen (15) calendar days referred to above, to agree on an arbitrator; if by the eleventh (11th) calendar day there is no agreement to an arbitrator, a district court shall appoint an arbitrator on the petition of any of the parties to the arbitration.

If an arbitrator determines that a violation has occurred, the arbitrator shall assess and award against the contractor or subcontractor the amount of penalty as provided above and the amount owed the worker. The County may use any amounts retained hereunder to pay the worker the amount as designated in the

arbitration award. If the County has not retained enough from the contractor or subcontractor to pay the worker in accordance with the arbitration award, the worker has a right of action against the contractor and subcontractor as appropriate, and the surety of either to receive the amount owed, attorneys' fees and court costs. The contractor shall promptly furnish a copy of the arbitration award to the County.

Money retained pursuant to the provisions above shall be used to pay the claimant or claimants the difference between the amount the worker received in wages for labor on the project at the rate paid by the contractor or subcontractor and the amount the worker would have received at the general prevailing wage rate as provided by the agreement of the claimant and the contractor or subcontractor affected, or in the arbitrator's award. The full statutory penalty of sixty dollars ($60.00) per calendar day of violation per worker shall be retained by Williamson County to offset its administrative costs, pursuant to Texas Government Code, Section, 2258.023. Any retained funds in excess of these amounts shall be paid to the contractor on the earlier of the next progress payment or final payment. Provided, however, that the County shall have no duty to release any funds to either the claimant or the contractor until it has received the notices of agreement or the arbitration award as provided under the provision herein-above.

4.43 CONFIDENTALITY

The Respondent expressly agrees that it will not use any direct or incidental confidential information that may be obtained while working in a governmental setting for its own benefit, and agrees that it will not access unauthorized areas or confidential information and it will not disclose any information to unauthorized third parties, and will take care to guard the security of the information at all times.

RFP 1705-166

Williamson County Jail Kitchen and Plumbing Remodel

1.0 Scope of Work Summary

The existing Williamson County Jail Facility is in need of a kitchen and plumbing remodel due to inadequate existing conditions at various plumbing, mechanical, fire stopping and electrical components throughout the North Area of the Jail (the "Project"). A complete set of construction documents has been developed for this Project. Provisions will be made to allow for a complete shut-down of the Jail Kitchen for up to 120 days to allow for the remodel in this area to occur. The following is a brief summary of the scope of work for this Project; however, it is not a complete or diagnostic list of all specifications to be included in this Project. Therefore, please refer to complete plans and specifications by Talex Engineers dated 5/22/17, for all requirements.

Fire Stopping
Existing conditions lack sufficient fire stopping at floor to floor penetrations. These include most pipe penetrations among other holes and penetrations. Fire stop drawings and specifications call for fire stopping installation at three floors at the North Area of the Jail Building.

Mechanical
Existing mechanical equipment is specified to be removed and replaced at the Jail Facility Kitchen. This includes items such as the kitchen hood, walk-in cooler refrigeration units andA/C duct work, among other items. The remodel design also includes new mechanical equipment installation at various areas throughout the facility, including new fresh air units, and a new DX HVAC Unit.

Electrical and Fire Alarm
Existing electrical components are specified to be removed and replaced such as light fixtures in the Jail Kitchen, among others. New wiring is also part of the design to include new wiring, breakers and disconnects at all new mechanical equipment. Existing fire alarm devices are to be relocated per plans.

Plumbing
The plumbing scope consists of the re-work of floor drains in the kitchen facility, to include extensions of trench drains. Gas plumbing work includes re-connection to kitchen appliances, and new feeds to new mechanical equipment. The water supply lines are specified to be lined with an epoxy liner throughout the North Area of the Jail Facility. The epoxy lining process will be broken into several different areas/phases to allow for the Jail Facility to remain open throughout construction.
NOTE: The plumbing portion will require, per §22 10 15 "In-place pressure pipe system rehabilitation" of the specifications, the NuFlow "Barrier Coating" specifications and methods for the application of an epoxy coating to the piping system. Therefore, it is vital that these specifications are comprehensively read and can be fully complied with by the contractor and hired plumbing tradesmen.

2.0 Construction Timeframe and requirements

TIME IS OF THE ESSENCE WITH THE PERFORMANCE OF THE CONTRACT FOR THIS PROJECT.

This Project includes very unique circumstances and factors due to the fact the Work being performed is on a jail facility which contains a jail kitchen that services Williamson County Jail inmate population. Williamson County has contracted with a third party to provide off-site meal preparation and delivery services to inmates of Williamson County Jail during complete shut-down and construction of the jail kitchen remodel portion of the Project (construction of the jail kitchen remodel portion of the Project shall be referred to as the "Jail Kitchen Remodel Work").

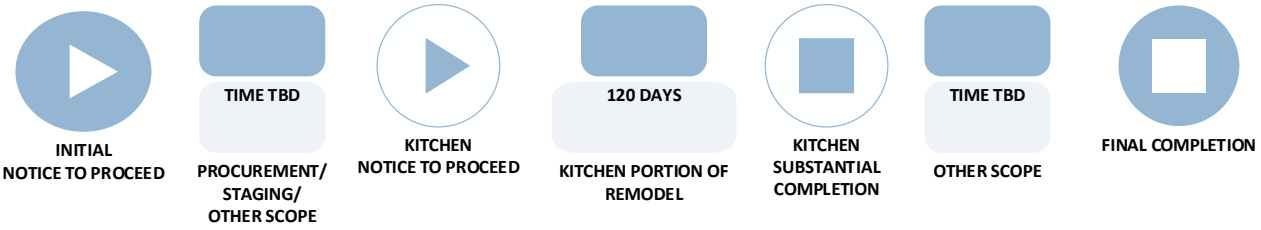
The rate for the above referenced offsite meal preparation and delivery services are substantially higher than the rate currently charged for food preparation services at the Williamson County jail kitchen facility. Williamson County cannot determine the total increased offsite meal costs at the time of contracting due to the daily change in jail inmate population. Williamson County will bear the additional offsite meal costs associated with the offsite meal preparation and delivery for up to one hundred twenty (120) calendar days in order to allow for the Jail Kitchen Remodel Work to be substantially completed and operational for preparation of all meals for the jail inmates. **Following the said one hundred twenty (120) calendar day time period, liquidated damages in the amount of $1,750.00 will be assessed against the successful respondent (also referred to herein as the "contractor") and deducted from any money due or that becomes due the contractor in accordance with the terms of the ensuing Agreement Between Owner and Contractor.**

In addition to the Jail Kitchen Remodel Work, the contractor will perform other Work on the Project that is unrelated, separate and apart from the Jail Kitchen Remodel Work (such other Work is herein referred to collectively as "Other Jail Work"). Portions of the Other Jail Work may be performed prior to, during and after the one hundred twenty (120) calendar day time frame allowed for the Jail Kitchen Remodel Work. The Other Jail Work is fully described in the Drawings, Specifications, details and other documents for the Project. The Other Jail Work includes, but is not be limited to the following:

1. procurement of necessary equipment and materials;
2. epoxy pipe system rehabilitation;
3. HVAC system in the south basement area
4. fire stopping installation;
5. HVAC equipment pads; and
6. new equipment installation that is not associated with the jail kitchen.

Williamson County will issue two (2) separate Notices to Proceed. One Notice to Proceed will be issued for only the Work relating to the Jail Kitchen Remodel Work portion of the Project. The other Notice to Proceed will be issued by Williamson County for the Other Jail Work portion of the Project. As set out herein, **the contractor must substantially complete the Jail Kitchen Remodel Work within one hundred twenty (120) calendar days of Williamson County's Notice to Proceed so that the jail kitchen is in a fully operable condition and able to serve the inmate population at the conclusion of the one hundred twenty (120) calendar day time period.** A separate substantial completion date or time period for the Other Jail Work will be negotiated prior to contract award and set forth in the ensuing Agreement Between Owner and Contractor.

Construction Timeline



3.0 **Proposal requirements and instructions**

3.1 Minimum Requirements

The minimum requirements are mandatory for the Respondent to be considered. Respondent should provide detailed support of each requirement as indicated below.

1. Respondent must be able to complete the Kitchen portion of the Remodel within 120 days, as indicated. Kitchen must be in operable, substantially completed condition within the 120 day period;
2. Respondent must be able to purchase and take delivery on site of all necessary material and equipment prior to the start of the 120 day Kitchen Remodel period;
3. Respondent must be able to provide Williamson County with the necessary information for the processing of background checks for employees and subcontractors.
4. Respondent must submit a list of a minimum of three projects completed within the last 10 years that are of similar size, scope and value as this Project. This list shall include a description of the project, location of the project and the contact information of the Owner and Architect or Engineer.
5. Respondent shall submit a statement that it can and will commence work on the Project within five days of receipt of a Notice to Proceed. Respondent shall also provide assurance that it can and will continue daily performance of the work until

fully completed.

6. Respondent shall submit with its proposal a letter from Respondent's bond company, registered to issue bonds in the state of Texas, stating the ability of the respondent to obtain a Performance and Payment Bond for the Project.

3.2 Preferred Requirements

1. Contractor shall maintain a permanent office and operate within a reasonable proximity of the Project site.
2. Respondent has experience with construction projects within a secured correctional facility;
3. Respondent has experience as a General Contractor using requirements of specification *Section 22 1015: In place Pressure Pipe System Rehabilitation*, including:
    a) Selection from subcontractors who have a minimum of five years using the required process and materials
    b) Experience with Quality Control of the specification and process
    c) Ability to purchase the needed quantities of the specified epoxy material

4.0 To be included with all proposals

Proposals must clearly identify and explain the firm's experience and fully address the following items:

1. How your firm meets each and every Minimum Requirement
2. Explain experience with any and all Preferred Requirements listed above
3. Explain all Construction experience within a secured correctional facility
    a) List processes used for all personnel that will be involved in the Project relating to clearance and ability to work within a secured correctional facility

4. List ALL projects completed within the last 10 years.
    a) Include:
        a) Project scope and location
        b) Project size (square footage) and dollar amount of the contract
        c) Number of days of project to completion, and if project was on schedule
        d) References for each project
5. Submit proposed subcontractor who will meet all requirements of specification *Section 22 1015: In place Pressure Pipe System Rehabilitation*

Evaluation Criteria for Williamson County Jail Kitchen & Plumbing Remodel

A. In order to qualify for this project the respondent must fully satisfy the following criteria:

1. Respondent shall have a physical office located within a reasonable proximity of the project location. Respondent must provide physical business address and how long at that location, as well as the extent of the business completed from this location;

2. Respondent shall provide a list of the proposed management team for the project, to include at least the Company owner, Project Manager, Superintendent, and other support team members. Please provide the resume of each team member;

3. Respondent shall provide documentation verifying, they have been conducting business as a General Contractor in Texas for a minimum of 5 (five) years.

4. Respondent shall supply a list of 3 (three) verifiable references from projects completed of similar or larger size, scope and dollar amount performed in Texas, within the last 5 years. The list must include at a minimum the project name, contact information (name, telephone and email), brief project description, size /square footage, project location, and project dollar amount. Respondent to provide the timeframe for completion, and if project was completed ahead of or on schedule, and if not explain why.

5. Respondent shall submit a Proposed Project Schedule to include the 120 Day period for the Kitchen portion of the remodel. All other scopes of the project can be performed during or outside of the 120 Day Kitchen Remodel time period.

6. Respondent shall submit with its proposal a letter from Respondent's bond company, registered to issue bonds in the state of Texas, stating the ability of the respondent to obtain a Performance and Payment Bond for the project.

7. Respondent shall submit the name and required qualifications for the Proposed Subcontractor that will be performing the NuFlow Barrier Coating portion of the project.

B. Respondents that fully comply with all the above requirements will then be considered and evaluated as follow:

1. An evaluation committee of at least three County representatives will evaluate the qualified respondents and make the determination regarding the successful company to proceed with negotiations and award.

2. The evaluation committee will review the following:

- Qualifications (40 Points)
  - *Respondents will be scored on their qualifications in relation to this project. The following factors will be considered to determine respondents qualifications and appropriate score:*
    - *Proposed management team's experience with similar projects.*
    - *Respondents years of experience conducting business in the State of Texas as a general contractor.*
    - *Proposed project schedule.*
- Pricing (25 Points)
  - *Points for pricing shall be determined by the following formula. 25 maximum points for pricing x (lowest respondents price proposal amount/respondents price proposal amount). Lowest respondent will receive the maximum 25 points.*
- Location of office (10 Points)
  - *10 maximum points for location of office. Points will be awarded in the following manner. 10 points for respondents with office location in Williamson County or an adjacent county. 5 points for respondents with an office in the State of Texas but outside of Williamson County or an adjacent county. 0 points for respondents with no office location in the State of Texas.*
- Reputation (25 Points)
  - *Respondents will be scored a maximum of 25 points on their reputation. Reputation of the respondents will be determined by the following factors:*
    - *References*
    - *Respondents safety record*
    - *Prior experience with Williamson County*

3. Contract negotiations, interviews and reference verification may also be a part of the selection process. Additional criteria if necessary for interviews will be provided to those selected respondents.

NOTE: The successful respondent will be required to execute a formal contract at Williamson County's offices in Georgetown, Texas within ten (10) days after the award. Said contract shall be in the same form as the Agreement Between Owner and Contractor that has been made a part of this RFP package. The only anticipated changes in the contract will be to include additional exhibits, to fill in blanks to identify the contractor, and terms relating to the contract price, or to revise the contract to accommodate corrections, changes in the scope of services, or changes pursuant to addenda issued. **Respondents should raise any questions regarding the terms of the contract, or submit requested changes in said terms, in the form of written questions or submittals.** Because the signed contract will be substantively and substantially derived from the Agreement Between Owner and Contractor that has been made a part of this RFP package, each respondent is urged to seek independent legal counsel as to any questions about the terms, conditions or provisions contained in the Agreement Between Owner and Contractor ***before*** submitting a proposal.

Again, the Agreement Between Owner and Contractor that has been made a part of this RFP package contains important legal provisions and is considered part and parcel of this Request for Proposals. Failure or refusal to sign aforesaid contract shall be grounds for Williamson County to revoke any award which has been issued, forfeit bid security, if applicable, and select another respondent.

PROJECT MANUAL

WILLIAMSON COUNTY JAIL RENOVATION

306 WEST 4TH STREET

GEORGETOWN, TEXAS 78626

MAY 22, 2017

TALEX, INC., ENGINEERS

TX FIRM 3712

6300 LA CALMA DR., SUITE 100

AUSTIN, TEXAS 78752

ARCHITECTURAL

00 11 00	CERTIFICATIONS
02 41 19	SELECTIVE DEMOLITION
04 20 00	UNIT MASONRY
07 21 00	BUILDING INSULATION
07 92 00	JOINT SEALANTS
09 22 16	NON-STRUCTURAL METAL FRAMING
09 29 00	GYPSUM BOARD
09 51 13	ACOUSTICAL PANEL CEILINGS
09 65 13	RESILIENT BASE AND ACCESSORIES
09 65 19	RESILIENT TILE FLOORING
09 67 23	RESINOUS FLOORING
09 91 23	PAINTING
10 26 00	WALL PROTECTION

FOOD SERVICE EQUIPMENT

11 40 00	FOOD SERVICE EQUIPMENT

PLUMBING

22 01 00	GENERAL REQUIREMENTS FOR PLUMBING WORK
22 05 05	PIPES, FITTINGS AND VALVES FOR PLUMBING PIPING AND EQUIPMENT
22 05 29	HANGERS AND SUPPORTS FOR PLUMBING PIPING
22 07 00	PLUMBING INSULATION
22 10 15	IN-PLACE PRESSURE PIPE SYSTEM REHABILITATION

MECHANICAL

23 01 00	GENERAL REQUIREMENTS FOR MECHANICAL WORK
23 05 03	PIPES AND TUBES FOR HVAC PIPING AND EQUIPMENT
23 05 13	COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT
23 05 23	GENERAL DUTY VALVES FOR HVAC PIPING
23 05 29	HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

23 05 48	VIBRATION CONTROLS FOR HVAC PIPING AND EQUIPMENT
23 05 93	HVAC TEST AND BALANCE
23 07 00	HVAC INSULATION
23 09 23	TEMPERATURE CONTROLS
23 30 00	AIR DISTRIBUTION
23 34 00	HVAC FANS
23 74 00	CENTRAL STATION AIR HANDLER
23 81 10	PACKAGED MAKE-UP AIR CONDITIONING UNITS
23 81 27	DUCTLESS SPLIT SYSTEM HEAT PUMP AIR CONDITIONING UNITS

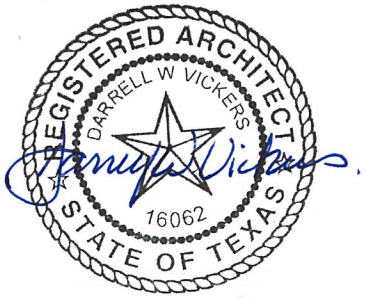
ELECTRICAL

26 01 00	GENERAL REQUIREMENTS FOR ELECTRICAL WORK
26 05 19	LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
26 05 26	GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
26 05 29	HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEM
26 05 33	RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS
26 05 53	IDENTIFICATION FOR ELECTRICAL SYSTEMS
26 28 20	ELECTRICAL EQUIPMENT
26 51 01	LIGHTING

CONTENTS

Williamson County Jail
Renovation
Georgetown, Texas

I hereby certify that the architectural specifications for this project were prepared by me, and under my direct supervision, and that I am a duly registered Architect under the laws of the State of Texas.



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The Texas Board of Architectural Examiners, P.O. Drawer 1233, Austin, Texas 78711-2337, or 333 Guadalupe St., Suite 2-350, Austin Texas 78701-3942, (512) 305-9000, has jurisdiction over individuals licensed under the Architect's Registration Law, Civil Statutes, Article 249A.

CP&Y, Inc. dba The Wallace Group
BR-161
P.O. Box 22007
Waco, TX 76702
(254) 772-9272

CONTENTS

Williamson County Jail
Renovation
Georgetown, Texas

I hereby certify that the mechanical, plumbing and electrical specifications for this project were prepared by me, and under my direct supervision, and that I am a duly registered Professional Engineer under the laws of the State of Texas.



The Texas Board of Professional Engineers, P.O. Drawer 18329, Austin, Texas 78760-8239, telephone (512) 440-7723, has jurisdiction over individuals licensed under the Texas Engineering Practice Act, Texas Civil Statutes, Article 3271a.

Talex, Inc., Engineers
TX Firm 3271
6300 La Calma, Suite 100
Austin, TX 78752

SECTION 02 41 19

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Demolition and removal of selected portions of building or structure.
   2. Demolition and removal of selected site elements.
   3. Salvage of existing items to be reused or recycled.

B. Related Requirements:
   1. Division 1 Section "Summary" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
   2. Division 1 Section "Execution Requirements" for cutting and patching procedures.
   3. Division 2 Section "Site Clearing" for site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner.

C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

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

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
   1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.
   1. Inspect and discuss condition of construction to be selectively demolished.
   2. Review structural load limitations of existing structure.
   3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
   4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
   5. Review areas where existing construction is to remain and requires protection.

1.6 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.7 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.8 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
   1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Historic Areas: Demolition and hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, including temporary protection, by 12 inches (300 mm) or more.

F. Storage or sale of removed items or materials on-site is not permitted.

G. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
   1. Maintain fire-protection facilities in service during selective demolition operations.

1.9 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties. Notify warrantor before proceeding.

B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

PART 2 - PRODUCTS

2.1 PEFORMANCE REQUIREMENTS

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

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
   1. Comply with requirements for existing services/systems interruptions specified in Division 1 Section "Summary."

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
   1. Arrange to shut off indicated utilities with utility companies.
   2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
   3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.

a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.

C. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Comply with requirements for access and protection specified in Division 1 Section "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 1 Section "Temporary Facilities and Controls."

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.

B. Removed and Salvaged Items:
1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch (19 mm) at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.

B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

E. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See Division 7 Sections for new roofing requirements.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

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

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

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

END OF SECTION

SECTION 04 20 00

UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Concrete masonry units.
   2. Mortar and grout.
   3. Steel reinforcing bars.
   4. Ties and anchors.
   5. Embedded flashing.
   6. Miscellaneous masonry accessories.

B. Related Sections:
   1. Division 08 Section for hollow metal frames in unit masonry openings.

1.3 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PERFORMANCE REQUIREMENTS

A. Provide concrete unit masonry that develops the following net-area compressive strengths at 28 days.
   1. f'm = 1900 psi (10.3MPa).

1.5 SUBMITTALS

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

B. Samples for Initial Selection:
   1. Unit masonry samples in small-scale form showing the full range of colors and textures available for each different exposed masonry unit required.

C. Samples for Verification: For each type and color of the following:
   1. Full-size units for each different exposed masonry unit required showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.
   2. Pigmented and colored-aggregate mortar. Make Samples using same sand and mortar ingredients to be used on Project.

3. Weep holes and vents.
4. Accessories embedded in masonry.

D. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.
1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

E. Mix Designs: For each type of mortar. Include description of type and proportions of ingredients.

1.6 QUALITY ASSURANCE

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

C. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Build mockups for each type of exposed unit masonry construction in sizes approximately 60 inches (1500 mm) long by 60 inches (1500 mm) high by full thickness, including face and backup wythes and accessories.
a. Include a sealant-filled joint at least 16 inches (400 mm) long in exterior wall mockup.
b. Include through-wall flashing installed for a 24-inch (600-mm) length in corner of exterior wall mockup approximately 16 inches (400 mm) down from top of mockup, with a 12-inch (300-mm) length of flashing left exposed to view (omit masonry above half of flashing).
c. Include studs, sheathing, building wrap, sheathing joint-and-penetration treatment air barrier, veneer anchors, flashing, cavity drainage material, and weep holes in exterior masonry-veneer wall mockup.
2. Where masonry is to match existing, erect mockups adjacent and parallel to existing surface.
3. Clean one-half of exposed faces of mockups with masonry cleaner as indicated.
4. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.

b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.

5. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.8 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches (600 mm) down both sides of walls and hold cover securely in place.
2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches (600 mm) down face next to unconstructed wythe and hold cover in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
   1. Concrete Masonry Units:
      a. Featherlite Building Products.
      b. Jewell Concrete Company

2.2 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
   1. Provide special shapes for sills, water table, mushroom caps, lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
   2. Provide bullnose-edged units for outside corners where indicated.

B. Standard CMUs: ASTM C 90.
   1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi (13.1 MPa).
   2. Density Classification: Standard weight.
   3. Size (Width): As indicated.
   4. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.

2.3 MASONRY LINTELS

A. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.4 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.

E. Aggregate for Mortar: ASTM C 144.
   1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
   2. For joints less than 1/4 inch (6 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
   3. White-Mortar Aggregates: Natural white sand or crushed white stone.

F. Aggregate for Grout: ASTM C 404.

G. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent by same manufacturer.

H. Water: Potable.

2.5 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).

B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.
   1. Interior Walls: Hot-dip galvanized, carbon steel.
   2. Exterior Walls: Hot-dip galvanized, carbon steel or Stainless steel.
   3. Wire Size for Veneer Ties: 0.187-inch (4.76-mm) diameter.
   4. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches (407 mm) o.c.
   5. Provide in lengths of not less than 10 feet (3 m), with prefabricated corner and tee units.

C. Masonry Joint Reinforcement for Single-Wythe Masonry: Ladder type with single pair of side rods.

D. Masonry Joint Reinforcement for Multiwythe Masonry:
   1. Ladder type with 1 side rod at each face shell of hollow masonry units more than 4 inches (100 mm) wide, plus 1 side rod at each wythe of masonry 4 inches (100 mm) wide or less.

2.6 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.
   1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
   2. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304 or Type 316.
   3. Galvanized Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 (Z180) zinc coating.
   4. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
   5. Stainless-Steel Sheet: ASTM A 666, Type 304 or Type 316.
   6. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
   7. Stainless-Steel Bars: ASTM A 276 or ASTM a 666, Type 304.

B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch (16-mm) cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches (50 mm) parallel to face of veneer.

C. Adjustable Masonry-Veneer Anchors:
   1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:
      a. Structural Performance Characteristics: Capable of withstanding a 100-lbf (445-N) load in both tension and compression without deforming or developing play in excess of 0.05 inch (1.3 mm).
   2. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section.
      a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
         1) Dayton Superior Corporation, Dur-O-Wal Division; D/A 213.
         2) Heckmann Building Products Inc.; Pos-I-Tie.
         3) Hohmann & Barnard, Inc.; DW-10 DW-10HS or DW-10-X.
      b. Anchor Section: Manufacturer's standard sheet metal plate.
      c. Fabricate sheet metal anchor sections and other sheet metal parts from minimum 0.075-inch- (1.90-mm-) thick, steel sheet, galvanized after fabrication.
      d. Wire Ties: Triangular-, rectangular-, or T-shaped wire ties fabricated from 0.187-inch- (4.76-mm-) diameter, hot-dip galvanized steel or stainless-steel wire.
   3. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene or EPDM washer, No. 10 (4.83-mm) diameter by length required to penetrate steel stud flange with not less than three exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B 117.
      a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
         1) ITW Buildex; Teks Maxiseal with Climaseal finish.
         2) Textron Inc., Textron Fastening Systems; Elco Dril-Flex with Stalgard finish.
   4. Stainless-Steel Drill Screws for Steel Studs: Proprietary fastener consisting of carbon-steel drill point and 300 Series stainless-steel shank, complying with ASTM C 954 except manufactured with hex washer head and neoprene or EPDM washer, No. 10 (4.83-mm)

diameter by length required to penetrate steel stud flange with not less than three exposed threads.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   1) Dayton Superior Corporation, Dur-O-Wal Division; Stainless Steel SX Fastener.
   2) ITW Buildex; Scots long life Teks.

2.7 MISCELLANEOUS ANCHORS

A. Unit Type Inserts in Concrete: Cast-iron or malleable-iron wedge-type inserts.

B. Dovetail Slots in Concrete: Furnish dovetail slots with filler strips, of slot size indicated, fabricated from 0.034-inch (0.86-mm), galvanized steel sheet.

C. Anchor Bolts: Headed or L-shaped steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.

D. Postinstalled Anchors: Torque-controlled expansion anchors or chemical anchors.
   1. Load Capacity: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
   2. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5 unless otherwise indicated.
   3. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.8 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with Division 07 Section "Sheet Metal Flashing and Trim"" and as follows:
   1. Stainless Steel: ASTM A 240/A 240M, Type 304, 0.016 inch (0.40 mm) thick.
   2. Copper: ASTM B 370, Temper H00, cold-rolled copper sheet, 16-oz./sq. ft. (4.9-kg/sq. m) weight or 0.0216 inch (0.55 mm) thick or ASTM B 370, Temper H01, high-yield copper sheet, 12-oz./sq. ft. (3.7-kg/sq. m) weight or 0.0162 inch (0.41 mm) thick.
   3. Fabricate continuous flashings in sections 96 inches (2400 mm) long minimum, but not exceeding 12 feet (3.7 m). Provide splice plates at joints of formed, smooth metal flashing.
   4. Fabricate through-wall metal flashing embedded in masonry from stainless steel or copper, with ribs at 3-inch (76-mm) intervals along length of flashing to provide an integral mortar bond.
      a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
         1) Cheney Flashing Company; Cheney Flashing (Dovetail) or Cheney 3-Way Flashing (Sawtooth).

2) Keystone Flashing Company, Inc.; Keystone 3-Way Interlocking Thruwall Flashing.
3) Sandell Manufacturing Co., Inc.; Mechanically Keyed Flashing.

5. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
6. Fabricate through-wall flashing with drip edge where indicated. Fabricate by extending flashing 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees and hemmed.

B. Flexible Flashing: Use one of the following unless otherwise indicated:
1. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.030 inch (0.76 mm).
a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
1) Advanced Building Products Inc.; Peel-N-Seal.
2) Fiberweb, Clark Hammerbeam Corp.; Aquaflash 500.
3) Grace Construction Products, W. R. Grace & Co. - Conn.; Perm-A-Barrier Wall Flashing.
4) Heckmann Building Products Inc.; No. 82 Rubberized-Asphalt Thru-Wall Flashing.
5) Hohmann & Barnard, Inc.; Textroflash.
6) W. R. Meadows, Inc.; Air-Shield Thru-Wall Flashing.
7) Polyguard Products, Inc.; Polyguard 300 or Polyguard 400.
b. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.
2. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy.
a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
1) DuPont; Thru-Wall Flashing.
2) Hohmann & Barnard, Inc.; Flex-Flash.
3) Hyload, Inc.; Hyload Cloaked Flashing System.
b. Monolithic Sheet: Elastomeric thermoplastic flashing, 0.040 inch (1.0 mm) thick.
c. Self-Adhesive Sheet: Elastomeric thermoplastic flashing, 0.025 inch (0.64 mm) thick, with a 0.015-inch- (0.38-mm-) thick coating of adhesive.
d. Self-Adhesive Sheet with Drip Edge: Elastomeric thermoplastic flashing, 0.025 inch (0.64 mm) thick, with a 0.015-inch- (0.38-mm-) thick coating of rubberized-asphalt adhesive. Where flashing extends to face of masonry, rubberized-asphalt coating is held back approximately 1-1/2 inches (38 mm) from edge.
e. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

C. Application: Unless otherwise indicated, use the following:
1. Where flashing is indicated to receive counterflashing, use metal flashing.
2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
3. Where flashing is fully concealed, use metal flashing or flexible flashing.

D. Solder and Sealants for Sheet Metal Flashings:

1. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
2. Solder for Copper: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.
3. Elastomeric Sealant: ASTM C 920, chemically curing urethane sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Weep/Vent Products: Use the following unless otherwise indicated:
1. Plastic Weep Hole/Vent: One-piece, rectangular plastic weep tube units made from clear butyrate, 3/8-inch outside diameter by 4 inches long, with wick and screen.
a. Products: Subject to compliance with requirements, provide the following:
1) Hohmann & Barnard, Inc.; #342W/S with stainless steel screen.
2) Approved equal.

E. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
1. Products: Subject to compliance with requirements, provide the following:
a. Mortar Net USA, Ltd.; Mortar Net.
b. Approved equal.

2.10 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime mortar unless otherwise indicated.
3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.
1. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.

C. Pigmented Mortar: Use colored cement product.
   1. Pigments shall not exceed 10 percent of portland cement by weight.
   2. Mix to match Architect's sample.

D. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
   1. Mix to match Architect's sample.

E. Grout for Unit Masonry: Comply with ASTM C 476.
   1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
   2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi (14 MPa).
   3. Provide grout with a slump of 8 to 11 inches (203 to 279 mm) as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
   1. Mix units from several pallets or cubes as they are placed.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:
   1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
   2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
   3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

B. Lines and Levels:
   1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2 inch (12 mm) maximum.
   2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
   3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.
   4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
   5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.
   6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2 inch (12 mm) maximum.
   7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch (1.5 mm) except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:
   1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
   2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
   3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
   4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).
   5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch (1.5 mm) from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets.

Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4-inches (100-mm). Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

H. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
   1. Install compressible filler in joint between top of partition and underside of structure above.
   2. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Division 07 Section "Fire-Resistive Joint Systems."

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow brick and CMUs as follows:
   1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
   2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
   3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
   4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.6 CAVITY WALLS

A. Bond wythes of cavity walls together using the following:
   1. Masonry Joint Reinforcement: Installed in horizontal mortar joints.
      a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.
      b. Where bed joints of wythes do not align, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties.
      c. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties to allow for differential movement regardless of whether bed joints align.
   2. Masonry Veneer Anchors: Comply with requirements for anchoring masonry veneers.

B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

C. Coat cavity face of backup wythe to comply with Division 07 Section.

3.7 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
   1. Space reinforcement not more than 16 inches (406 mm) o.c.
   2. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.8 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to wall framing with masonry-veneer anchors to comply with the following requirements:
   1. Fasten screw-attached anchors through sheathing to wall framing with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
   2. Embed tie sections in masonry joints.
   3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
   4. Space anchors as indicated, but not more than 18 inches (458 mm) o.c. vertically and 24 inches (610 mm) o.c. horizontally, with not less than 1 anchor for each 2 sq. ft. (0.2 sq.

m) of wall area. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 8 inches (203 mm), around perimeter.

5. Space anchors as indicated, but not more than 16 inches (406 mm) o.c. vertically and 18 inches (457 mm) o.c. horizontally with not less than 1 anchor for each 2.67 sq. ft. (0.25 sq. m) of wall area. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 36 inches (914 mm), around perimeter.

3.9 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry using one of the following methods:
   1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
   2. Install preformed control-joint gaskets designed to fit standard sash block.

C. Form expansion joints in brick as follows:
   1. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch (10 mm) for installation of sealant and backer rod specified in Division 07 Section "Joint Sealants."

3.10 LINTELS

A. Install steel lintels where indicated.

B. Provide concrete or masonry lintels where shown and where openings of more than 12 inches (305 mm) for brick-size units and 24 inches (610 mm) for block-size units are shown without structural steel or other supporting lintels.

C. Provide minimum bearing of 8 inches (200 mm) at each jamb unless otherwise indicated.

3.11 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

B. Install flashing as follows unless otherwise indicated:
   1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
   2. At multiwythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of 8 inches (200 mm), and through inner wythe to within 1/2 inch (13 mm) of the interior face of wall in exposed masonry. Where interior face of wall is to receive furring or framing, carry flashing completely through inner wythe and turn flashing up approximately 2 inches (50 mm) on interior face.

3. At masonry-veneer walls, extend flashing through veneer, across air space behind veneer, and up face of sheathing at least 8 inches (200 mm); with upper edge tucked under building paper or building wrap, lapping at least 4 inches (100 mm).
4. At lintels and shelf angles, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.
5. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall and adhere flexible flashing to top of metal drip edge.
6. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.

C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

D. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:
1. Use specified weep/vent products to form weep holes.
2. Space weep holes 24 inches (600 mm) o.c. unless otherwise indicated.

E. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

3.12 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

3.13 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent

construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
   1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
   2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
   3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
   4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
   5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
   6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

END OF SECTION

SECTION 07 21 00

BUILDING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: Glass-fiber blanket insulation.

1.3 SUBMITTALS

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

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

1.4 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.1 GLASS-FIBER BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. CertainTeed Corporation.
   2. Johns Manville.
   3. Owens Corning.

B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

C. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:

1. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
   1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
   2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
   3. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
   4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
   5. For wood-framed construction, install blankets according to ASTM C 1320 and as follows:
      a. With faced blankets having stapling flanges, secure insulation by inset, stapling flanges to sides of framing members.
      b. For unfaced blankets at roof framing, hold in place with poultry netting.

C. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

3.4 INSTALLATION OF INSULATION IN CEILINGS FOR SOUND ATTENUATION

Where glass-fiber blankets are indicated for sound attenuation above ceilings, install blanket insulation over entire ceiling area in thicknesses indicated. Extend insulation 48 inches (1219 mm) up either side of partitions.

3.5 PROTECTION

A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Silicone joint sealants.
   2. Urethane joint sealants.
   3. Mildew-resistant joint sealants.
   4. Butyl joint sealants.
   5. Latex joint sealants.

1.3 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Joint-Sealant Schedule: Include the following information:
   1. Joint-sealant application, joint location, and designation.
   2. Joint-sealant manufacturer and product name.
   3. Joint-sealant formulation.
   4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE

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

B. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.6 FIELD CONDITIONS

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

1.7 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
   1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.

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

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following:
   1. Architectural sealants shall have a VOC content of 250 g/L or less.
   2. Sealants and sealant primers for nonporous substrates shall have a VOC content of 250 g/L or less.

C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. Silicone, S, NS, 50, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      a. Dow Corning Corporation: #795.
      b. GE Construction Sealants; Momentive Performance Materials Inc.: Silpruf.

2.3 URETHANE JOINT SEALANTS

A. Urethane, S, NS, 35, NT: Single-component, nonsag, nontraffic-use, plus 35 percent and minus 35 percent movement capability, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 35, Use NT.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      a. BASF Construction Chemicals - Construction Systems: Sonolastic NP-1.

B. Urethane, S, P, 25, T: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic-use, urethane joint sealant; ASTM C 920, Type S, Grade P, Class 25, Use T.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      a. BASF Construction Chemicals - Construction Systems: Sonolastic SL-1.

2.4 MILDEW-RESISTANT JOINT SEALANTS

A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      a. Dow Corning Corporation.
      b. GE Construction Sealants; Momentive Performance Materials Inc.

2.5 BUTYL JOINT SEALANTS

A. Butyl-Rubber-Based Joint Sealants: ASTM C 1311.

2.6 LATEX JOINT SEALANTS

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

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   a. BASF Construction Chemicals - Construction Systems.
   b. Pecora Corporation.
   c. Sherwin-Williams Company (The).

2.7 JOINT-SEALANT BACKING

A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.8 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

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

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
   1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested

and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
   a. Concrete.
   b. Masonry.
   c. Unglazed surfaces of ceramic tile.
3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
   a. Metal.
   b. Glass.
   c. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
   1. Do not leave gaps between ends of sealant backings.
   2. Do not stretch, twist, puncture, or tear sealant backings.
   3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
   1. Place sealants so they directly contact and fully wet joint substrates.

2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.4 CLEANING

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

3.5 PROTECTION

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

3.6 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior and interior joints in horizontal traffic surfaces.
1. Joint Locations:
a. Control and expansion joints in brick pavers.
b. Isolation and contraction joints in cast-in-place concrete slabs.
c. Joints between plant-precast architectural concrete paving units.
d. Joints in stone paving units, including steps.
e. Tile control and expansion joints.
f. Joints between different materials listed above.
g. Other joints as indicated on Drawings.
2. Joint Sealant: Urethane, S, P, 25, T, M, O.

B. Joint-Sealant Application: Exterior and interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
a. Construction joints in cast-in-place concrete.
b. Joints between plant-precast architectural concrete units.
c. Control and expansion joints in unit masonry.
d. Joints in dimension stone cladding.
e. Joints in glass unit masonry assemblies.
f. Joints in exterior insulation and finish systems.

g. Joints between metal panels.
h. Joints between different materials listed above.
i. Perimeter joints between materials listed above and frames of doors windows and louvers.
j. Control and expansion joints in ceilings and other overhead surfaces.
k. Other joints as indicated on Drawings.

2. Joint Sealant: Urethane, S, NS, 35, NT.

C. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
b. Tile control and expansion joints where indicated.
c. Other joints as indicated on Drawings.
2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.

D. Joint-Sealant Application: Concealed mastics.
1. Joint Locations:
a. Aluminum thresholds.
b. Sill plates.
c. Other joints as indicated on Drawings.
2. Joint Sealant: Butyl-rubber based.

END OF SECTION

SECTION 09 22 16

NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Non-load-bearing steel framing systems for interior gypsum board assemblies.
   2. Suspension systems for interior gypsum ceilings and soffits.

B. Related Requirements:
   1. Section 05 40 00 "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
   1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
   2. Protective Coating: ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized.

B. Studs and Runners: ASTM C 645.
   1. Steel Studs and Runners:
      a. Minimum Base-Metal Thickness: 0.018 inch (0.45 mm) unless otherwise indicated.
      b. Depth: As indicated on Drawings.

C. Cold-Rolled Channels: Cold-Rolled Furring Channels: 0.053-inch (1.34-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
   1. Depth: 3/4 inch (19 mm).
   2. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

D. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
   1. Minimum Base-Metal Thickness: 0.018 inch (0.45 mm)unless otherwise indicated.
   2. Depth: 7/8 inch (22.2 mm).

E. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches (32 mm), wall attachment flange of 7/8 inch (22 mm), minimum uncoated-metal thickness of 0.018 inch (0.45 mm), and depth required to fit insulation thickness indicated.

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

B. Hanger Attachments to Concrete:
   1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.
      a. Type: Postinstalled, expansion anchor.
   2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.

C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch (4.12 mm) in diameter.

D. Flat Hangers: Steel sheet, 1 by 3/16 inch (25 by 5 mm) by length indicated.

E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch (1.34 mm) and minimum 1/2-inch- (13-mm-) wide flanges.
   1. Depth: 1-1/2 inches (38 mm) unless otherwise indicated.

F. Furring Channels (Furring Members):
   1. Cold-Rolled Channels: 0.053-inch (1.34-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges, 3/4 inch (19 mm) deep.
   2. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch (22 mm) deep.
      a. Minimum Base-Metal Thickness: 0.018 inch (0.45 mm).
   3. Resilient Furring Channels: 1/2-inch- (13-mm-) deep members designed to reduce sound transmission.
      a. Configuration: Asymmetrical.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.
   1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

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

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
   1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.
   1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
   1. Single-Layer Application: 16 inches (406 mm) o.c. unless otherwise indicated.
   2. Multilayer Application: 16 inches (406 mm) o.c. unless otherwise indicated.
   3. Tile Backing Panels: 16 inches (406 mm) o.c. unless otherwise indicated.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
   1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
   2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
      a. Install two studs at each jamb unless otherwise indicated.
      b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
      c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
   3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
   4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
      a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
   5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
   6. Curved Partitions:
      a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
      b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches (150 mm) o.c.

E. Direct Furring:
   1. Screw to wood framing.
   2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.

F. Z-Furring Members:
   1. Erect insulation, specified in Section 07 21 00 "Thermal Insulation," vertically and hold in place with Z-furring members spaced 24 inches (610 mm) o.c.
   2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.
   3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches (305 mm) from corner and cut insulation to fit.

G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

3.5 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
   1. Hangers: 48 inches (1219 mm) o.c.
   2. Carrying Channels (Main Runners): 48 inches (1219 mm) o.c.
   3. Furring Channels (Furring Members): 16 inches (406 mm) o.c.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:
   1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
      a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
   2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
      a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
   3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
   4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
   5. Do not attach hangers to steel roof deck.
   6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
   7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
   8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION

SECTION 09 29 00

GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Interior gypsum board.
   2. Texture finishes.

B. Related Requirements:
   1. Section 09 22 16 "Non-Structural Metal Framing" for non-structural framing and suspension systems that support gypsum board panels.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For the following products:
   1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.
   2. Textured Finishes: Minimum 2 feet by 2 feet for each textured finish indicated and on same backing indicated for Work.

1.4 DELIVERY, STORAGE AND HANDLING

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

1.5 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. American Gypsum.
2. CertainTeed Corporation.
3. Georgia-Pacific Building Products.
4. National Gypsum Company.

B. Gypsum Wallboard: ASTM C 1396/C 1396M.
1. Type X where indicated or required for fire-resistance-rated assemblies.
2. Thickness: 5/8 inch (15.9 mm) unless otherwise indicated..
3. Long Edges: Tapered.

C. Flexible Gypsum Board: ASTM C 1396/C 1396M. Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.
1. Thickness: 1/4 inch (6.4 mm).
2. Long Edges: Tapered.

D. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces. Install in all "wet" areas, including ceilings; behind tile finishes except at showers. Refer to Division 9 Section "Tiling" for shower backing panels.
1. Type X where indicated or required for fire-resistance-rated assemblies.
2. Thickness: 5/8 inch (15.9 mm) unless otherwise indicated.
3. Long Edges: Tapered.
4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
2. Shapes:
   a. Cornerbead.
   b. LC-Bead: J-shaped; exposed long flange receives joint compound.
   c. L-Bead: L-shaped; exposed long flange receives joint compound.
   d. Expansion (control) joint.
   e. Curved-Edge Cornerbead: With notched or flexible flanges.

2.5 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:
   1. Interior Gypsum Board: Paper.
   2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
   1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
   2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
      a. Use setting-type compound for installing paper-faced metal trim accessories.
   3. Fill Coat: For second coat, use drying-type, all-purpose compound.
   4. Finish Coat: For third coat, use drying-type, all-purpose compound.
   5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound or high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

2.6 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
   1. Laminating adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
   1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.

D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
   1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      a. Pecora Corporation.
      b. Specified Technologies, Inc.

2.7 TEXTURE FINISHES

A. Finish: Water-based, job-mixed, drying-type texture finish and synthetic sand for spray application.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. CertainTeed Corporation.
      b. National Gypsum Company.
   2. Texture: Light stipple texture according to sample approved by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
   1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
   2. Fit gypsum panels around ducts, pipes, and conduits.
   3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:
   1. Wallboard Type: Vertical surfaces unless otherwise indicated.
   2. Type X: Where required for fire-resistance-rated assembly.
   3. Flexible Type: Apply in double layer at curved assemblies.
   4. Moisture- and Mold-Resistant Type: As indicated on Drawings and behind tile finishes.
   5. Type C: Where required for specific fire-resistance-rated assembly indicated.

B. Single-Layer Application:
   1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
   2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
      a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
      b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
   3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.

4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:
1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches (400 mm) minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

E. Curved Surfaces:
1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch- (300-mm-) long straight sections at ends of curves and tangent to them.
2. For double-layer construction, fasten base layer to studs with screws 16 inches (400 mm) o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches (300 mm) o.c.

3.4 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C 840 and manufacturer's recommendations and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:
1. Cornerbead: Use only where indicated.
2. LC-Bead: Use at exposed panel edges.
3. L-Bead: Use where indicated.

3.5 FINISHING GYPSUM BOARD

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

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
   1. Level 1: Ceiling plenum areas, concealed areas, and where indicated. Embed tape in joint compound.
   2. Level 2: Panels that are substrate for tile and where indicated. Embed tape in joint compound and apply first coat of joint compound.
   3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated. Embed tape in joint compound and apply first, fill (second) and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration.
   4. Level 5: Where indicated on Drawings and as a substrate for dry-erase wallcoverings. Finish per level 4, then apply skim coat of joint compound to wall as needed to provide smooth surface free of visual defects.

3.6 APPLYING TEXTURE FINISHES

A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.

B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.

C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written recommendations.

3.7 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

SECTION 09 51 13

ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes:
   1. Acoustical ceiling panels.
   2. Exposed ceiling suspension systems.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed acoustical panel ceilings similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Single-Source Responsibility for Ceiling Units: Obtain each type of acoustical ceiling panel from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

C. Single-Source Responsibility for Suspension System: Obtain each type of suspension system from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

B. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.5 PROJECT CONDITIONS

A. Space Enclosure and Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet-work in spaces is completed and dry, work above ceilings is complete, and ambient temperature and humidity conditions are being maintained at the levels indicated for Project when occupied for its intended use.

1.6 COORDINATION

A. Coordinate layout and installation of acoustical panels and suspension system components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system components (if any), and partition

assemblies (if any).

1.7 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
   1. Ceiling Tile: Furnish quantity of full-size units equal to a minimum of one full box each for each type, composition, color, pattern, and size indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, acoustical panels that may be incorporated in the Work include, but are not limited to, the following:
   1. Ceramic and Mineral Fiber Composite Panels:
      a. Ceramaguard #605; Armstrong World Industries.

2.2 ACOUSTICAL PANELS, GENERAL

A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.

B. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.

2.3 ACOUSTICAL PANEL REQUIREMENTS

A. Panel Characteristics: Type XX, Pattern G for acoustical panels per ASTM E 1264, Fire Class A, with painted finish, complying with requirements indicated below:
   1. Color/Light Reflectance Coefficient: White/LR 0.88
   2. Edge Detail: Square
   3. Thickness: 5/8 inch
   4. Size: 24 by 48 inches.

B. Suspension System Type: As described below and specified in Part 2 "Non-Fire-Resistance-Rated, Direct-Hung Suspension Systems" Article:
   1. Wide-face, single-web, steel suspension system.

2.4 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension System Standard: Provide manufacturer's standard hot-dip galvanized metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C 635 requirements.

B. Finishes and Colors: Provide manufacturer's standard factory-applied finish for type of system indicated.

C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
1. Zinc-Coated Carbon Steel Wire: ASTM A 641 (ASTM A 641M), Class 1 zinc coating, soft temper.
2. Size: Select wire diameter so that its stress at 3 times the hanger design load (ASTM C 635, Table 1, Direct Hung) will be less than the yield stress of wire, but provide not less than 0.106-inch- (2.69-mm-) diameter wire.

D. Sheet-Metal Edge Moldings and Trim: Type and profile indicated, or if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material and finish as that used for exposed flanges of suspension system runners.
1. Provide extruded aluminum edge moldings at exterior locations, painted white finish.

2.5 NON-FIRE-RESISTANCE-RATED, DIRECT-HUNG SUSPENSION SYSTEMS

A. Wide-Face, Single-Web, Capped, Hot Dip Galvanized, Steel Suspension System: Main and cross runners roll formed from prepainted or electrolytic zinc-coated, cold-rolled steel sheet, with prepainted 15/16-inch- (24-mm-) wide flanges; other characteristics as follows:
1. Structural Classification: Intermediate-duty system.
2. Finish: Painted white.
3. Provide hold-down clips to keep panels in place.

B. Available Manufacturers: Subject to compliance with requirements, manufacturer's suspension systems that may be incorporated in the Work include, but are not limited to, the following:
1. Armstrong World Industries
2. Chicago Metallic Corporation.
3. USG Interiors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish the layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and conform to the layout shown on reflected ceiling plans.

3.3 INSTALLATION

A. General: Install acoustical panel ceilings to comply with publications referenced below per manufacturer's instructions and CISCA "Ceiling Systems Handbook."
1. Standard for Ceiling Suspension System Installations: Comply with ASTM C 636.
2. CISCA Recommendations for Acoustical Ceilings: Comply with CISCA

"Recommendations for Direct-Hung Acoustical Tile and Lay-In Panel Ceilings."

B. Suspend ceiling hangers from building's structural members and as follows:
   1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of the supporting structure or of the ceiling suspension system.
   2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
   3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
   4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of 3 tight turns. Connect hangers either directly to structures or to inserts, eye screws, or other devices that are secure, that are appropriate for substrate, and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
   5. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers, unless otherwise shown; and provide hangers not more than 8 inches (200 mm) from ends of each member.

C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
   1. Screw attach moldings to substrate at intervals not over 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.18 mm in 3.66 m). Miter corners accurately and connect securely.

D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

E. Provide additional bracing of suspension system at exterior locations to resist wind load.

F. Install acoustical panels with undamaged edges and fitted accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide neat, precise fit.
   1. Arrange directionally patterned acoustical panels as follows:
      a. Install panels with pattern running in one direction parallel to long axis of space.
   2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
   3. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
   4. Install hold-down clips; space as recommended by panel manufacturer's written instructions unless otherwise indicated.

END OF SECTION 09 51 13

SECTION 09 65 13

RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Resilient base.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches (300 mm) long.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Furnish not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 DELIVERY, STORAGE, AND HANDLING

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

1.6 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive resilient products during the following time periods:
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.

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

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

PART 2 - PRODUCTS

2.1 THERMOSET-RUBBER BASE

A. Manufacturers: Subject to compliance with requirements, provide the following:
   1. Roppe Corporation, USA.

B. Product Standard: ASTM F 1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous). Provide manufacturer's standard cove with top-set toe, 48" cut lengths, 1/8" thick, with job formed exterior and interior corners. 4" height or as indicated.

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

C. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of flooring, and in maximum available lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
   1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
   1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until they are the same temperature as the space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

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

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Job-Formed Corners:
1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends.
2. Inside Corners: Use straight pieces of maximum lengths possible.

3.4 RESILIENT ACCESSORY INSTALLATION

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

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after completing resilient-product installation:
1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum horizontal surfaces thoroughly.
3. Damp-mop horizontal surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION

SECTION 09 65 19

RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes vinyl composition floor tile.

B. Resilient wall base, reducer strips, and other accessories installed with resilient floor tiles are specified in Division 9 Section "Resilient Wall Base and Accessories."

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for each type of product specified and samples for initial selection purposes in form of manufacturer's color charts consisting of actual tiles or sections of tiles showing full range of colors and patterns available for each type of resilient floor tile indicated.

C. Maintenance data for resilient floor tile, to include in Operating and Maintenance Manual specified in Division 1.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility for Floor Tile: Obtain each type, color, and pattern of tile from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store flooring materials in dry spaces protected from the weather with ambient temperatures maintained between 50 deg F (10 deg C) and 90 deg F (32 deg C).

B. Store tiles on flat surfaces. Move tiles and installation accessories into spaces where they will be installed at least 48 hours in advance of installation.

1.6 PROJECT CONDITIONS

A. Maintain a minimum temperature of 70 deg F (21 deg C) in spaces to receive tiles for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. After this period, maintain a temperature of not less than 55 deg F (13 deg C).

Do not install tiles until they are at the same temperature as the space where they are to be installed.

B. Close spaces to traffic during tile installation.

1.7 SEQUENCING AND SCHEDULING

A. Install tiles and accessories after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide the following:
1. Match existing.

2.2 RESILIENT TILE

A. Vinyl Composition Floor Tile: Products complying with ASTM F 1066, Composition 1 (nonasbestos formulated), 12" x 12" x 1/8" thick, Class 2, smooth surface.

2.3 INSTALLATION ACCESSORIES

A. Concrete Slab Primer: Nonstaining type as recommended by flooring manufacturer.

B. Trowelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by tile manufacturer for applications indicated.

C. Adhesives (Cements): Water-resistant Low-VOC type recommended by tile manufacturer to suit resilient floor tile products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. General: Examine areas where installation of tiles will occur, with Installer present, to verify that substrates and conditions are satisfactory for tile installation and comply with tile manufacturer's requirements and those specified in this Section.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials whose presence would interfere with bonding of adhesive. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by tile manufacturer.
2. Finishes of subfloors comply with tolerances and other requirements specified in Division 3 Section "Cast-In-Place Concrete" for slabs receiving resilient flooring.
3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits of any

kind.

4. Underlayment surface is free of surface irregularities and substances with potential to interfere with adhesive bond, show through surface, or stain tile.

C. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with manufacturer's installation specifications to prepare substrates indicated to receive tile.

B. Use trowelable leveling and patching compounds per tile manufacturer's directions to fill cracks, holes, and depressions in substrates.

C. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, by using a terrazzo or concrete grinder, a drum sander, or a polishing machine equipped with a heavy-duty wire brush.

D. Broom or vacuum clean substrates to be covered by tiles immediately before tile installation. Following cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust.

E. Apply concrete slab primer, if recommended by flooring manufacturer, prior to applying adhesive. Apply according to manufacturer's directions.

3.3 INSTALLATION

A. General: Comply with tile manufacturer's installation directions and other requirements indicated that are applicable to each type of tile installation included in Project.

B. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths at perimeter that equal less than one-half of a tile. Install tiles square with room axis, unless otherwise indicated.

C. Match tiles for color and pattern by selecting tiles from cartons in same sequence as manufactured and packaged, if so numbered. Cut tiles neatly around all fixtures. Discard broken, cracked, chipped, or deformed tiles. Lay tiles with grain running in one direction.

D. Scribe, cut, and fit tiles to butt tightly to vertical surfaces, permanent fixtures, pipes, outlets, edgings, thresholds, and nosings.

E. Extend tiles into toe spaces, door reveals, closets, and similar openings.

F. Adhere tiles to flooring substrates without producing open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections in completed tile installation.

G. Use full spread of adhesive applied to substrate in compliance with tile manufacturer's directions including those for trowel notching, adhesive mixing, and adhesive open and working times.

H. Hand roll tiles where required by tile manufacturer.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after completing tile installation:
   1. Remove visible adhesive and other surface blemishes using cleaner recommended by tile manufacturers.
   2. Sweep or vacuum floor thoroughly.
   3. Do not wash floor until after time period recommended by resilient floor tile manufacturer.
   4. Damp-mop tile to remove black marks and soil.

B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by flooring manufacturer.
   1. Apply protective floor polish to floor surfaces that are free from soil, visible adhesive, and surface blemishes, if recommended in writing by manufacturer.
      a. Use commercially available product acceptable to flooring manufacturer.
      b. Coordinate selection of floor polish with Owner's maintenance service.
   2. Cover products installed on floor surfaces with undyed, untreated building paper until inspection for Substantial Completion.
   3. Do not move heavy and sharp objects directly over floor surfaces. Place plywood or hardboard panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

C. Clean floor surfaces not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean products according to manufacturer's written recommendations.
   1. Before cleaning, strip protective floor polish that was applied after completing installation only if required to restore polish finish and if recommended by flooring manufacturer.
   2. After cleaning, reapply polish to floor surfaces to restore protective floor finish according to flooring manufacturer's written recommendations. Coordinate with Owner's maintenance program.

END OF SECTION

SECTION 09 67 23

RESINOUS FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes resinous seamless flooring system.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for each type of product specified and samples for initial selection purposes in form of manufacturer's color charts consisting of actual sections showing full range of colors and patterns available for each type of resinous flooring indicated.

C. Maintenance data for resinous flooring, to include in Operating and Maintenance Manual specified in Division 1.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility for Flooring: Obtain from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

B. Manufacturer: The manufacturer shall have a minimum of seven years experience in the production, sales and technical support of cementitious urethane, polyurethane industrial flooring and related materials.

C. Applicator: Applicator must be approved by the flooring system manufacturer and have a minimum of 5 years experience on comparable projects.

D. System must be in compliance with requirements of the United States Department of Agriculture (USDA), Food and Drug Administration (FDA) and the local Health District.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver components to site in manufacturer's packaging, clearly identified with the product name and batch number.

B. Store flooring materials in dry spaces protected from the weather, out of direct sunlight, with ambient temperatures maintained between 50 deg F (10 deg C) and 90 deg F (32 deg C).

1.6 PROJECT CONDITIONS

A. Application may proceed while air, material and substrate temperatures are between 50 deg F (10 deg C) and 90 deg F (32 deg C) as long as the substrate temperature is at least 5 deg F above the dewpoint and the relative humidity is below 90 percent.

B. Close spaces to traffic during flooring installation.

1.7 WARRANTY

A. Special Warranty on resinous flooring: Manufacturer's standard form in which manufacturer agrees to replace flooring that shows evidence of product defects for a period of one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide the following:
1. Flowfresh HF Heavy Duty trowel down cementitious urethane seamless flooring system, Flowcrete North America, Inc., 11133 I-45 S, Suite K, Conroe, TX 77302, telephone (936) 359-6700.
2. System Components:
a. Topping: Flowfresh Base A, Hardener B, pigment pack and Flowfresh HF Filler C. Flowfresh HF is certified phthalate free and is supplied with Polygiene anti-microbial additive.
b. Patch Materials: Flowfresh SR for shallow fill and patching (up to ¼ inch). Flowfresh HF for deep fill and sloping material (over ¼ inch).
3. Thickness: ¼ inch.
4. Color and texture: As selected by Architect.

B. Product Requirements, Flowfresh Topping:
1. Percent Solids: 100 %
2. VOC: <10 g/L
3. Bond Strength to Concrete, ASTM D 4541: >400 psi, failure in substrate.
4. Compressive Strength, ASTM C 579: 8,000 psi.
5. Tensile Strength, ASTM C 307: 1,450 psi
6. Flexural Strength, ASTM C 580: 2,900 psi
7. Impact Resistance at 125 mils, MIL D-3134, no visible damage or deterioration:160 inch lbs.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. General: Examine areas where installation of resinous flooring will occur, with Installer present, to verify that substrates and conditions are satisfactory for installation and comply with material manufacturer's requirements and those specified in this Section for maximum moisture content, installation tolerances, and other conditions affecting flooring performance. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Concrete Subfloors: Verify that concrete slabs comply with the following:
   1. Slab substrates are dry and free of laitance, oil, grease, curing compounds, loose particles, friable matter, dirt, bituminous products and all other contaminants.
   2. Moisture Testing: Perform moisture vapor emission (calcium chloride) test in accordance with ASTM F 1869-10.
      a. Perform three tests for the first 1,000 square feet and then one test per subsequent 1,000 square feet.
      b. The vapor drive should be within range acceptable to manufacturer.

C. Mechanical surface preparation:
   1. Shot blast all surfaces to receive flooring system with a mobile steel shot, dust recycling machine (Blastrac or equal). All surface and embedded accumulations of paint, toppings, hardened concrete layers, laitance, power trowel finishes, and other similar surface characteristics shall be completely removed leaving a bare concrete surface having a minimum profile of CSP 5-6 as described by the International Concrete Repair Institute.
   2. Floor areas inaccessible to the mobile blast machines shall be mechanically abraded to the same degree of cleanliness, soundness, and profile using diamond grinders, needle guns, bush hammers, or other suitable equipment.
   3. Where the perimeter of the substrate to be coated is not adjacent to a wall or curb, a minimum ¼" key cut shall be made to properly seat the system, providing a smooth transition between areas. The detail cut shall also apply to drain perimeters and expansion joint edges.
   4. Cracks and joints (non-moving) greater than 1/8- inch wide are to be chiseled or chipped-out and repaired per manufacturer's recommendations.

3.2 APPLICATION

A. General:
   1. The system shall be applied in three distinct steps as listed below.
   2. Immediately prior to the application of any component of the system, the surface shall be dry and any remaining dust or loose particles shall be removed using a vacuum or clean, dry, oil-free compressed air.
   3. The handling, mixing and addition of components shall be performed in a safe manner to achieve the desired results in accordance with the manufacturer's recommendations.
   4. The system shall follow the contour of the substrate unless pitching or other leveling work is indicated.
   5. A neat finish with well-defined boundaries and straight edges shall be provided by the applicator.

B. Topping:
   1. The topping shall be applied as a trowel applied system in one lift with a nominal thickness of ¼-inch.
   2. The topping shall be comprised of four components: Base A, Hardener B, pigment pack, and Filler C as supplied by the manufacturer.
   3. The pigment pack shall be added to the Base and thoroughly dispersed, then the Hardener shall be added to the Base and pigment and be thoroughly mixed by approved mechanical means. Flowfresh HF Filler C shall then be added to the mixing vessel and mixed in a manner to achieve a homogenous blend.

4. The topping shall be applied over horizontal surfaces using a screed box, then compacted and finished with a trowel. In smaller areas or where access is limited, the mortar can be spread using a trowel.
5. Immediately upon placing, the topping shall be lightly rolled with a ¼" napped roller.

C. Coving:
1. Application to cove should be carried out using Flowfresh CM, using Peran TCW as primer.

3.3 FIELD QUALITY CONTROL

A. The following tests shall be conducted by the applicator:
1. Temperature: Air, substrate temperature, and, if applicable, dewpoint.
2. Coverage rates: Application rate shall be monitored by checking quantity of material used against the area covered.

3.4 CLEANING AND PROTECTION

A. Cure flooring material in compliance with manufacturer's directions, taking care to prevent their contamination during stages of application and prior to completion of the curing process.

B. Remove masking. Perform detail cleaning at floor termination, leaving cleanable surface for subsequent work of other sections.

END OF SECTION

SECTION 09 91 23

PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes surface preparation and field painting of the following substrates:
   1. Exposed exterior items and surfaces, including exposed piping.
   2. Exposed interior items and surfaces in occupied areas, including metal deck, joists, and ductwork where scheduled.
   3. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other sections.

B. Paint exposed surfaces, except where the schedules indicate that a surface or material is not to be painted or is to remain natural. If the schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available.

C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

D. Related Requirements:
   1. Division 8 Sections for shop priming of steel doors and frames.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
   1. Submit Samples on representative sample of the actual substrate, minimum 8 inches (200 mm) square, with texture to simulate actual conditions.
   2. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:
   1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
   2. VOC content.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Paint: One gal. (3.8 L) of each material and color applied.

1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
      a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
      b. Other Items: Architect will designate items or areas required.
   2. Final approval of color selections will be based on mockups.
   3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

B. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, including product name, color name, and number.

B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

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

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Benjamin Moore & Co.

2. Kelly-Moore Paints.
3. PPG Architectural Finishes, Inc.
4. Pratt & Lambert
5. Sherwin-Williams Company (The).
6. Manufacturers of specialty products listed in schedules.

B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in other Part 2 articles for the paint category indicated.

2.2 PAINT, GENERAL

A. Material Quality: Provide manufacturer's best-quality paint material for the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be allowed.

B. Material Compatibility:
1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction.

D. Colors: As selected by Architect.

2.3 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and CMU): 12 percent.
3. Wood: 15 percent.
4. Gypsum Board: 12 percent.
5. Plaster: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Plaster Substrates: Verify that plaster is fully cured.

E. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.

F. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

G. Proceed with coating application only after unsatisfactory conditions have been corrected.
1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

B. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

C. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

D. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

E. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.
1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."
3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."

F. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

H. Aluminum Substrates: Remove loose surface oxidation.

I. Wood Substrates:
   1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
   2. Sand surfaces that will be exposed to view, and dust off.
   3. Prime edges, ends, faces, undersides, and backsides of wood.
   4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

A. Use applicators and techniques suited for paint and substrate indicated. Provide spray-applied finish for hollow metal door frames.
   1. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
   2. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
   3. Seal tops, bottoms, and cutouts of wood doors. Paint tops and bottoms of metal doors to match door.
   4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
   5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

D. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections. Unless otherwise directed, provide satin finish for final coats.

E. Block Fillers: Apply block fillers to concrete masonry units at a rate to ensure complete coverage with pores filled.

F. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and in occupied spaces.

G. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
   1. Paint the following work where exposed in occupied spaces:
      a. Equipment, including panelboards.
      b. Uninsulated metal piping.
      c. Uninsulated plastic piping.
      d. Pipe hangers and supports.
      e. Metal conduit.
      f. Plastic conduit.
      g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
      h. Other items as directed by Architect.
   2. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

H. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
   1. Contractor shall touch up and restore painted surfaces damaged by testing.
   2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. Ferrous and Zinc-Coated Metal: Provide the following finish systems over exterior metal. Primer is not required on shop-primed or galvanized items. Touch up finish as needed.
   1. Semigloss, Acrylic-Enamel Finish: 2 finish coats over a rust-inhibiting primer.
      a. Primer: Total dry film thickness of not less than 5 mils.
         1) S-W: Pro Industrial Pro-Cryl Universal Primer B66-310 Series.
      b. First and Second Coats: Total dry film thickness of not less than 5 mils.

1) S-W Sher-cryl HPA High Performance Acrylic B66-350 Series.

3.7 INTERIOR PAINTING SCHEDULE

A. Ferrous and Zinc-Coated Metal: Provide the following finish systems over metal. Primer is not required on shop-primed or galvanized items. Touch up finish as needed. Provide spray-applied finish for hollow metal door frames.
   1. Semigloss, Acrylic-Enamel Finish: 2 finish coats over a rust-inhibiting primer.
      a. Primer: Total dry film thickness of not less than 1.7 mils.
         1) S-W: PrepRite Bonding Primer B51W50.
      b. First and Second Coats: Total dry film thickness of not less than 3.2 mils.
         1) S-W ProClassic Interior Semi-gloss Waterborne Acrylic Enamel B31 Series.

B. Gypsum Drywall Systems:
   1. Eggshell Emulsion Finish (ceilings): Three coats, low VOC products.
      a. Primer: White, interior, latex-based primer.
         1) S-W: ProMar 200 Low VOC Interior Latex Primer.
      b. First and Second Coats: Eggshell, interior, acrylic enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 3.4 mils.
         1) S-W: ProMar 200 Low VOC Interior Latex Eg-shel.
   2. Semi-Gloss Emulsion Finish (walls where indicated): Three coats, low VOC products.
      a. Primer: White, interior, latex-based primer.
         1) S-W: ProMar 200 Low VOC Interior Latex Primer.
      b. First and Second Coats: Semigloss, interior, acrylic enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 3.2 mils.
         1) S-W: ProMar 200 Low VOC Interior Latex Semi-Gloss.
   3. Epoxy Emulsion Finish (where scheduled): Three coats.
      a. Primer: White, interior, latex-based primer.
         1) S-W: PrepRite 200 Latex Primer.
      b. First and Second Coats: Interior, Water-based epoxy.
         1) S-W: Water Based Catalyzed Epoxy.

C. Concrete Masonry Units: Provide the following finish systems over interior concrete masonry block units:
   1. Epoxy Emulsion Finish: Three coats. Spot prime/fill previously painted areas.
      a. Block Filler: Heavy duty acrylic resin block filler applied at spreading rate recommended by the manufacturer to achieve a total dry mil thickness of not less than 8.5 mils. Surface must be smooth and pinhole-free.
         1) S-W: PrepRite Block Filler.
      b. First and Second Coats: Interior, Water-based epoxy.
         1) S-W: Water Based Catalyzed Epoxy.

D. Sealed Concrete: Provide the following finish system over concrete floors:
   1. Acrylic Polymer Liquid:
      a. Kure-N-Seal WB, Sonneborn Building Products.

END OF SECTION

SECTION 10 26 00

WALL PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes stainless steel corner guards.

B. Related Sections:
1. Section 08 71 00 "Door Hardware" for metal armor, kick, mop, and push plates.

1.3 ACTION SUBMITTALS

A. Product Data: Include construction details, material descriptions, impact strength, fire-test-response characteristics, dimensions of individual components and profiles, and finishes for each impact-resistant wall protection unit.

B. Shop Drawings: For each impact-resistant wall protection unit showing locations and extent. Include sections, details, and attachments to other work.
1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Samples for Initial Selection: For each type of impact-resistant wall protection unit indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each impact-resistant wall protection unit to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Source Limitations: Obtain impact-resistant wall protection units from single source from single manufacturer.

C. Product Options: Drawings indicate size, profiles, and dimensional requirements of impact-resistant wall protection units and are based on the specific system indicated. Refer to Section 01 40 00 "Quality Requirements."

D. Revise subparagraph below to suit Project.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. Surface-Burning Characteristics: Provide impact-resistant, wall protection units with surface-burning characteristics as determined by testing identical products per ASTM E 84, NFPA 255, or UL 723 by UL or another qualified testing agency.

F. Regulatory Requirements: Comply with applicable provisions in [the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines] [and] [ICC/ANSI A117.1].

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store impact-resistant wall protection units in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install impact-resistant wall protection units until building is enclosed and weatherproof, wet work is complete and dry, and HVAC system is operating and maintaining temperature at 70 deg F (21 deg C) for not less than 72 hours before beginning installation and for the remainder of the construction period.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Surface-Mounted, Metal Corner Guards: Fabricated as one piece from formed or extruded metal with formed edges; with 90- or 135-degree turn to match wall condition.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      a. Construction Specialties.
   2. Material: Stainless-steel sheet, Type 304.
      a. Thickness: Minimum 0.0625 inch (1.6 mm).
      b. Finish: Directional satin, No. 4.
   3. Wing Size: Match existing.
   4. Corner Radius: 1/8 inch (3 mm).
   5. Mounting: Flat-head, countersunk screws through factory-drilled mounting holes.

2.2 FABRICATION

A. Fabricate impact-resistant wall protection units to comply with requirements indicated for design, dimensions, and member sizes, including thicknesses of components.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Examine walls to which impact-resistant wall protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Complete finishing operations, including painting, before installing impact-resistant wall protection system components.

B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

A. Installation Quality: Install wall and door protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

3.4 CLEANING

A. Immediately after completion of installation, clean corner guards using a standard, ammonia-based, household cleaning agent.

END OF SECTION

SECTION 114000 GENERAL FOOD SERVICE EQUIPMENT SPECIFICATIONS

11400.1 SCOPE OF WORK:

The work covered by this Section includes the furnishing of all labor, materials, accessories, and special services necessary to complete the work specified herein and where shown and scheduled on the Drawings.

11400.1.01 WORK INCLUDED:

A. Provide and install all Walk-In Freezer/Coolers and Shelving at the food service facility.

B. Locate and provide to the General Contractor or install all hidden (in floor or in wall) supports, brackets, or fittings.

C. Installation excluding connections to utilities. It is the responsibility of the Food Service Contractor to verify that all utility services are located in the proper locations for the equipment being supplied.

D. Work shall include the provision for setting, testing, and calibration, starting-up, demonstration, warranting of all food service items to the satisfaction of the Owners.

E. The Kitchen Equipment Contractor shall obtain and pay for all necessary permits and licenses required and necessary for the performance of the work, and shall post all notices required by law, comply with all laws, ordinances, and regulations bearing on the conduct of the work as drawn and specified.

F. On any work upon which an inspection certificate by local authorities, State Fire Marshall, or any other governing body is required, such inspection or certificates shall be obtained by the Kitchen Equipment Contractor and shall be paid for by him.

G. All plumbing, electrical, and ventilation work required to connect with equipment will be done by other contractors unless specifically called for in “Itemized Specifications”. The work to be done by these other contractors shall include roughing-in to points indicated on mechanical plans, and the final connections from the roughing-in point to the various pieces of equipment requiring such connections, and the supplying of all necessary material and labor for this work except as hereinafter noted.

H. Refrigeration work shall be handled by the Kitchen Equipment Contractor except for electrical and plumbing connections to compressors, blower coils, controls, etc. These final connections will be made by other contractors.

I. All line and disconnect switches, safety cut-offs, control panels, fuse boxes or other electrical controls, fittings, and connections will be furnished and Installed by others. Starting switches are to be provided by the Kitchen Equipment Contractor as specified under “General Specifications”. Those starting switches furnished loose as standardized by Food Service Equipment Manufacturers (other than fabricated items) shall be mounted and wired complete under Electrical Contract.

J. Any sleeves or conduit required for refrigeration, carbonated water, or CO2 tubing will be furnished and installed under electrical or mechanical contract by others.

K. Necessary flues and/or vents of size and capacity required to operate fixtures specified, together with final connection between roughed-in vent openings and fixtures, will be furnished and installed by other contractors, unless otherwise specified in “Itemized Specifications”.

L. Unless specifically called for in the following specifications, ventilating fans and all duct work between same and fixtures, and from same to discharge opening in building, will be

furnished and installed by Mechanical Contractor.

M. Water inlets shall be located above the positive water level to prevent siphoning of liquids into the potable water system. Wherever conditions shall require submerged inlet, suitable approved type of check valve and vacuum breaker shall be placed on the fixture to form part of same to prevent siphoning. If exposed and design dictates, piping, and fittings shall be chrome plated. These vacuum breakers as required to be provided by Kitchen Equipment Contractor.

11400.1.02 NOT USED

11400.1.03 REFERENCES:

A. ANSI/ASTM A167 - Stainless and Heat-resisting Chromium Nickel Steel Plate, Sheet and Strip

B. ANSI/AWS D1.1 - Structural Welding Code

C. ASTM A446 - Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality

D. FS DD-G-451 - Glass, Float or Plate, Sheet, Figured (Flat for Glazing, Mirrors, and Other Uses.)

E. FS-DD-G-1403 - Glass, Plate (Float), Sheet Figured, and Spandrel (Heat Strengthened and Fully Tempered).

11400.1.04 REGULATORY REQUIREMENTS:

Companies specializing in the manufacture of commercial food service equipment with minimum ten years' experience. Companies will comply with all prison/correctional facility setting requirements and codes.

11400.1.05 REGULATORY REQUIREMENTS:

A. Cooler and Freezer Units: Listed by Underwriters Laboratories, Inc. (UL).

B. Electrical Wiring and Components and Self-contained Refrigeration Systems: Conform to Underwriters' Laboratories, Inc. (UL) standards.

C. Conform to requirements of National Electric Manufacturers Association (NEMA) and the Underwriters' Laboratories, Inc. (UL).

D. Conform to the requirements of the Texas Department of Health.

E. Conform to the requirements of the American Society of Mechanical Engineers (ASME).

F. Conform to applicable section(s) of the Southern Building Code Congress International.

G. Conform and comply with all prison/correctional facility requirements and codes.

11400.1.06 SUBMITTALS:

A. Kitchen Equipment Contractor shall prepare detailed shop drawings, prepared at a scale of 3/4" to the foot, plus necessary cross sections at a scale of 1-1/2" to the foot, showing complete detail of each item of specially fabricated equipment.

B. *Shop Drawings:* Each manufacturer whose work requires fabrication and/or erection drawings and the preparation of adjacent work by others to accommodate special equipment shall prepare and submit shop drawings to the Architect/Owner for review prior to

fabrication. Complete shop drawings of all equipment and data sheets from manufacturers shall be assembled in loose-leaf binders and six (6) copies shall be submitted to Architect/Owner. Refer to Division 1 of these Specifications for requirements.

C. The Kitchen Equipment Contractor shall check all measurements at the building site and be responsible for same. Measurements shown on drawing accompanying these specifications are approximate and are for establishing purposes only. Where necessary, KEC shall confer with the Owner or General Contractor and the Title Contractor to coordinate and establish such finished dimensions as are required, and furnish drawings to confirm these established dimensions wherever necessary. At the time of checking measurements, the KEC shall carefully examine the spaces and existing conditions and report to the Owner any work performed by others or planned by others which prevent him from execution of his work as required under the contract. The KEC shall obtain the Owner's final decision and instructions before proceeding with the portion of his detailed drawing.

D. Should the contract for food service equipment be awarded after the mechanical services have been roughed-in, the Kitchen Equipment Contractor shall carefully measure the locations of all floor and wall penetrations and existing conditions and indicate them; and provide for them on the shop drawings and final mechanical plans. If the inspection reveals that any of these existing conditions seriously interfere with the execution of the work as required under this Contract, the K.E.C. is to report these conditions to the Consultant and await a decision and instruction before proceeding with that portion of the detailed drawings.

E. Submit manufacturer's installation instructions under provisions of Section 01400.

11400.1.07 MATERIAL AND WORKMANSHIP:

A. Unless otherwise specified or shown on drawings, all material shall be new, of best quality, perfect, and without flaws. Material shall be delivered and maintained on job, in an undamaged condition. Samples of materials shall be available should the Owner request it.

B. All workmanship shall be the best of their respective kind, equal to the standards of manufacture used by all first-class equipment manufacturers. All labor shall be performed in a thorough, workmanlike manner by qualified, efficient, and skilled mechanics of the trades involved.

C. All items of standard equipment shall be the latest model at time of delivery.

11400.1.08 SANITARY CONSTRUCTION:

All equipment is to be constructed in full compliance with the Local and State Public Health Regulations in which the installation is to be made.

11400.1.09 OPERATION AND MAINTENANCE DATA:

A. Include data on care of finished surfaces.
B. Submit a list of factory authorized Repair Agencies for all equipment

11400.1.10 DELIVERY, STORAGE, AND HANDLING:

A. Store products clear of floor in manner to prevent warping and damage.
B. Coordinate size of access and route to place of installation.

11400.1.11 WARRANTY:

A. Provide manufacturer's warranty.

B. Warranty: Include coverage of scheduled equipment, including disconnection of defective unit, and connection of replacement unit.
C. All compressors shall be furnished by the K.E.C. (kitchen equipment contractor) with extended four-year full-replacement warranties for a total of five years with an initial one-year contractor's warranty.
D. Kitchen Equipment Contractor shall make suitable arrangements with local approved service and repair agencies for the servicing and maintenance of the equipment should malfunctions occur within factory warranty period. Upon completion of the installation and prior to the final payment, the Contractor shall furnish the Owner with a list of the local agencies to be called in the event malfunctions occur for any equipment supplied.

11400.2 FABRICATORS/DEALERS/CONTRACTORS – PRE-APPROVED:

Mission Restaurant Supply
6500 No. Lamar St.
Austin, Texas 78752
(512) 389-1705
Attn: Bruce Walker

1st Choice Restaurant Equipment & Supply, LLC
Don Hudspeth, Project Manager
6108 HWY 290 West
Austin, TX 78735
Cell: 210-589-5690
Fax: 512-233-0686
OR
15018 Tradesman Drive
San Antonio, Texas 78249
Cell: 210-589-5690
Email: don@1stchoicecompanies.com

11400.2.01 ALL FABRICATORS/DEALERS/CONTRACTORS:
To be accepted as a bidder, contractor shall be approved by the Food Service Consultant or the Owner prior to bidding.

11400.3.01 PRODUCTS

11400.3.02 EQUIPMENT:
A. Refer to schedule,
B. Provide rough-in hardware, supports and connections, attachment devices, closure trim, accessories.

11400.3.03 MATERIALS:
A. All stainless steel shall be the minimum or heavier than the United States standard gauge 18-8, type 302, not over .012% maximum carbon, No.4 finish except where otherwise specified. All welds shall be ground smooth and polished to a No.4 finish, except where specified otherwise.

B. Finish Hardware: Manufacturer's standard; Prison compliant
C. Black Iron (BI) or ferrous metals used shall be minimum 16 GA., fully welded at all joints and seams, and properly insulated as required by applicable codes, and to meet the requirements of NFPA Bulletin 96, current issue.
D. Structural Steel shall consist of angles, channels, bands, bars, straps, or other shapes, ductile in quality and free of corrosion, runs, checks, and crack, and surface defects. Members shall be galvanized.
E. White metal (castings and components) shall consist of corrosion-resistant metal containing not less than 30% nickel. All castings shall be rough ground, polished, and buffed to a bright luster, free from all pits, burrs, or imperfections.
F. Work Surfaces: Stainless Steel on all metal casework and plastic laminate on all plastic laminate covered wood casework.
G. Fittings: Sink drains with crumb cup and waste fittings, and faucets.
H. Service Outlet Covers and Escutcheons: Stainless Steel
I. Sealants: As required by manufacturer.
J. <u>GENERAL CONSTRUCTION:</u>
    1. All items of specially fabricated equipment must be by one manufacturer acceptable to the Owner.
    2. All work must be done in an approved workmanlike manner to the complete satisfaction of the Owner and be compliant with all state prison/correctional facility codes.
    3. All galvanized iron shall be Armco or equal. Framework of galvanized iron shall be welded construction. All welds shall be smooth, and where galvanizing has burned off the weld shall be touched up with a high-grade aluminum paint.
    4. All rolls shall be a minimum of 5/8" radius, except as detailed to the contrary, with corners bull nosed, ground and polished.
    5. All seams and joints shall be welded as the nature of the material used may require. Welds to be ground smooth and polished to match the original finish. Materials 18-gauge or heavier shall be welded.
    6. Field joints in stainless steel tops, etc., where required due to limitations of sheet sizes, equipment sizes, or installation requirements, shall be made sanitary tight and without open seams by means of welding, or if detailed or specified, by properly designed draw fastening, trim strip, or commercial joint material to suit the purpose required.
    7. Butt joints made by riveting straps under seams and then filled with solder will not be accepted.
    8. Ends of all fixtures, splash backs, shelves, etc., shall be filled by forming the metal or welded sections, if necessary, to finish entire rear of fixtures, etc. flush to walls or adjoining fixtures.
    9. All components of fixtures shall be fabricated of materials shown below, unless otherwise indicated:
        a. Shelving: fully welded heavy duty, High tensile extruded aluminum Type 6063-T5 alloy per manufactured Standard Specifications for use in prisons/correctional facilities.
        a. Walk-in Refrigerated fixture exterior: Manufacturer's Standard Specification (see 11400.5)
        b. Walk-in Refrigerated fixture interior: Manufacturer's Standard Specification

(see 11400.5)

10. HARDWARE:
    a. All hardware shall be solid materials. Handle and wearing parts to be cast brass, chrome plated except where specified to the contrary. Hardware shall be locking-type as specified.
    b. All hardware shall be identified with manufacturer's name and number so that broken or non-working parts may be replaced. Contractor shall submit samples for approval, where required.
11. SWITCHES, CONTROLS, AND ELECTRICAL WORK:
    a. All internal wiring for fabricated equipment, including all electrical devices, wiring controls, switches, etc. built into or forming an integral part of these items, shall be furnished and installed by the Kitchen Equipment Contractor, in his factory, or at the building site with all items complete to junction boxes as required. Final connections of the equipment shall be made by the Electrical Contractor from the equipment to the junction boxes.
    b. Provide standard 3-prong plugs to fit "U" slot grounding type receptacles for all equipment items powered by plugging into 110-120 volts, single phase AC. Also, provide suitable length 3-wire cord for the equipment.
12. QUIETNESS OF OPERATION: Quietness of operation of all food service equipment is a requirement. The contractor will be required to remove or repair any equipment which produces objectionable noise.
13. THERMOMETERS: All refrigerated compartments, fabricated and standard, shall be equipped with dial-type thermometers with chrome plate bezels. Thermometers shall be adjustable and shall be calibrated after installation.
14. EXPANSION VALVES: All standard reach-in refrigerators and freezers for remote refrigeration systems shall be complete with thermostatic expansion valves at the evaporator.
15. REFRIGERATION HARDWARE: Refrigeration hardware for standard and fabricated refrigerator compartments shall be heavy duty components. Hinges shall be self-closing. Latching to be magnetic edge mount type, unless specified or detailed to the contrary.
16. LOCKS: All doors for reach-in refrigerated and frozen compartments, both fabricated and standard items, shall be fitted with cylinder locking type latches and shall be provided with master keys. Doors and drawers of fabricated items shall be fitted with locks and master keyed, separate from refrigerated compartments.
17. TRIMMING AND SEALING EQUIPMENT:
    a. Space between all units to walls, ceiling, floors and adjoining units not portable and with enclosed bodies, shall be completely sealed against entrance of food particles or vermin by means of trim strips, welding or soldering or commercial joint material as suited to the nature of the equipment and in compliance with local Health Department regulations.
    b. Ends of all hollow sections to be closed.
    c. Enclosed fixtures without legs not mounted on masonry bases shall be sealed water tight to floor, except when specified to be portable. (Refrigerators, ice cream cabinets, ovens, etc.)

11400.3.04 FABRICATION GENERAL:

A. Stainless Steel Fastenings and Fittings: Bolts and screws with countersunk flat heads should be used. Use concealed fastenings where possible.
B. Form edges smooth. Fabricate sheet material for work surfaces, facings, shelves, and drain boards of straight lengths in one continuous sheet whenever over 12 ft. in length.
C. Fix leg-mounted units by doweling to floor with 1/4" stainless steel pins, where vibration or oscillation is anticipated.
D. Provide legs of adjustable, stainless steel/Aluminum feet. Fasten legs to equipment securely and rigidly.
E. Install rubber or nylon button feet or other protective device on bearing surface of any item positioned on a finished surface.
F. Isolate rotating or reciprocating machinery to prevent noise and vibration.
G. Provide indirect drain piping from equipment to terminate over nearest waste receptor.
H. Provide accommodation for site installation of other services or equipment.
I. Grind welds of stainless steel smooth and flush; polish to match adjacent surfaces.
J. Cut and drill components for service outlets and fixtures.
K. Shop assemble work where possible
L. Unless otherwise approved, the work as included under this heading of the specifications shall conform to all applicable current Standards and Revisions established by the National Sanitation Foundation (NSF), Ann Arbor, Michigan.

11400.3.05 FABRICATION, HARD SURFACE: Reinforce frame support system and surfaces so that surfaces may safely support a load of 200# lbs. concentrated on one square foot in any area on surface with no indentation showing on surface and with permanent set not exceeding 0.005 inches.

11400.3.06 SERVICE ACCESSORIES:

A. Provide control switch or starter on each motor-driven appliance or heating element in accordance with UL requirements.
B. Provide internal wiring for equipment, including electrical devices, wiring controls, and switches to a common junction box.
C. Provide suitable length of three-wire cord with plugs to match building receptacles.
D. Provide lamps for fixtures in equipment.
E. Provide equipment with connection terminals so that connections of plumbing, gas, steam, electrical, ventilation and refrigeration services can be made. Where receptacles are specified for custom equipment, supply cut outs and outlet boxes set in place accessible for connections of electrical work.

11400.3.07 FINISHES:

A. Metal (Except Stainless Steel): Degrease and phosphate etch followed by primer and a minimum of two coats of epoxy enamel, as selected by Architect or Owner.
B. Stainless Steel shall be manufacturer's standard SS finish and for fabricated items shall be polished and grained to a #4 commercial finish. Polishing grain shall run in the same direction on equipment wherever possible. Polishing grain shall be mitered on intersecting planes. All sheets shall be deburred before working, and all equipment shall exhibit no burrs upon installation.
C. Exposed, exterior galvanized surfaces shall not be painted. Recoat any areas where

galvanized has been removed or damaged in working with ARMCO Zinc-Grip, self-priming galvanized lacquer. Remove all machine oils or foreign material before recoating.

D. Shop shall pre-finish all components.
E. Manufacturer's standard finish for equipment: refer to equipment listing at the end of this specification.

11400.4 EXECUTION

11400.4.01 INSPECTION:

A. All sizes given or derived on drawings are to be as accurate as can be determined prior to construction. The Food Service Contractor shall check all dimensions in the field that affect the work. He shall not order any items requiring critical installation clearances or fitting before verifying field dimensions. Source water pressure, temperature, gas service, and site voltage shall all be verified by the Food Service Contractor prior to commencement of work under this section. Where obstructions are found to occur the Food Service Contractor shall accommodate the structure of the building in for the equipment.
B. Verify ventilation outlets, service connections, and supports are correct and in required location.
C. The Owner or Consultant shall have free access to the Kitchen Equipment Contractor's shop during the construction of this equipment for the purpose of making inspections to see that plans, specifications and detail drawings are being adhered to carefully. Kitchen Equipment Contractor shall correct any errors found during these inspections to the extent and within the scope of the plans, specifications and detail drawings.
D. Material delivered to the site will be carefully inspected by the Owner as to conforming to plans and specifications. The Kitchen Equipment Contractor shall, within twenty-four hours after receiving written notice, proceed to remove from the grounds or building all materials, fixtures, or apparatus condemned by the Owner, whether the same shall be reworked or taken down and remove all portions of the work which the Owner shall deem as failing to conform to the drawings and specifications and to the conditions of the contract.
E. The Owner shall have the right to order the work wholly or partially stopped until the objectionable work, materials, fixtures, or apparatus are removed or to declare the contract forfeited for non-performance or not being executed according to the intent or meaning of the drawings and specifications.
F. All fabricated equipment shall be subject to test as to gauge of material upon Owner's request. This testing shall be at the Kitchen Equipment Contractor's expense.
G. INSURANCE: See Article 1.1 of the Supplementary Conditions for insurance requirements.
H. ROYALTIES AND PATENTS:
    1. The Kitchen Equipment Contractor shall pay all royalties and license fees.
    2. The Kitchen Equipment Contractor hereby covenants and agrees to save the Owner harmless and indemnify the Owner from the payment of any royalties, damages, losses, or expenses for suits, claims or otherwise, resulting for alleged infringement of patents, materials and methods used in the fabrication of this equipment.
I. ACCESS, AUTHORITY, AND STOPPAGE:
    1. The work shall be available for inspection at any time by representatives of the Owner.
    2. All materials and work not in conformity with the plans and specifications shall be subject to rejection. Owner shall be the sole judge of compliance with the plans and

specifications.

3. All defective work or materials shall be immediately replaced to conform to the plans and specifications.
4. Consultant shall have the right to order the work of the Contractor or any sub-contractor wholly or partially stopped if, in their judgment, the materials furnished or the work being done is not in strict accordance with the provisions and specifications, or until any objectionable man or material is removed from the premises; and shall have the right to declare the contract forfeited for non-performance when not being executed according to the intent and meaning of the contract, plans and specifications.

11400.4.02 INSTALLATION:

A. Insulate to prevent electrolysis between dissimilar metals. Provide sealant to achieve clean joint without crevices.
B. Weld and grind joints in stainless steel work tight, without open seams, where necessary due to limitations of sheet sizes or installation requirements.
C. Sequence installation and erection to ensure mechanical and electrical connections are achieved in an orderly and expeditious manner.
D. Cut, fit, and patch where necessary. Coordinate work with others.
E. Cut and drill tops, backs or other elements for service outlets, fixtures and fittings.
F. Provide cutting and patching of items of this Section required for the installation of services of equipment.

11400.4.03 MECHANICAL/ELECTRICAL SERVICE:

A. Furnish equipment completely inter wired for service to a single point of connection where indicated. Fabricated items shall feature service extended to junction boxes mounted on equipment bodies.
B. Final connection of all equipment to filled stubs shall be by Other Contractor, including all materials to do so.
C. Electrical Contractor to coordinate cords and caps for plug-in devices.
D. All wiring shall be concealed and only rigid conduit shall be used.
E. Any cover plated shall match the finish to which they are secured; All switches and controls shall be easily identified, and multiple controls shall have engraved nameplates adhesive-attached thereto, for identification. Submit a sample of the intended material for approval.
F. Water inlets shall be located above the positive water level in all areas. Wherever a submerged inlet can occur, provide an approved vacuum breaker or back flow preventer.
G. Provide suitable pipe slots through equipment for placement and conducting of services without cutting of equipment.
H. Final connection of all plumbing services shall be by the Plumbing Contractor.
I. All horizontal piping shall be kept at the highest level to facilitate cleaning. Extend from rough-ins to point of connection after equipment is set in place.

11400.4.04 ADJUSTING AND CLEANING:

A. Adjust equipment and apparatus to ensure proper working order and conditions.
B. Remove masking or protective covering from stainless steel and other finished surfaces.
C. Remove and replace equipment which creates noise or vibration.
D. Wash and clean equipment thoroughly.

E. Polish glass, plastic, hardware and accessories, fixtures, and fittings.

11400.4.05 DEMONSTRATION AND TESTING:

A. The Food Service Contractor shall start-up all equipment, regulate, calibrate, demonstrate, or test all items, and generally evidence to the Owner(s) satisfaction that the equipment is proper, functioning, and as specified (unless otherwise specified). He shall order and pay for any tests by municipal or regulatory authorities who question the suitability of equipment provisions under their jurisdiction. Final cleaning and polishing prior to placing in service shall be by the Owner.
B. 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.
C. Individual performing demonstration shall be fully knowledgeable of all operating and service aspects of equipment.
D. After all utility connections to the equipment are made by other contractors, the KEC shall conduct the final test of equipment in the presence of the Owner, or his duly authorized representative.
E. Kitchen Equipment Contractor shall furnish two (2) sets of dimensional prints, data sheets, spare parts lists, and operating instructions, for each piece of mechanical equipment; each set to be bound in a hard cover.
F. Before final inspection by Owner, the Kitchen Equipment Contractor shall remove protective covering from his work and give all parts of his equipment a thorough cleaning and servicing, leaving all items free from defects.

11400.5 EQUIPMENT SPECIFICATIONS – DETAILED (BY ITEM):

KolPak is basis of design. Alternate manufacturer Thermo-Kool.
Refrigeration equipment is as described on the Drawings.

Item #1 **<u>Provide (1) Walk-in Freezer “A” and (1) Walk-in Cooler “B”, KolPak, Custom Model (as specified below)</u>:**

Freezer Unit “A” will measure 15’ 1” on interior from north to south by 18’10-1/2” across (front to back; east to west; inclusive of walls and wall column). Freezer “A” adjoins to Cooler “B” and is accessed through it.

Cooler Unit “B” will measure 15’ 6-1/2” on the back (west) wall from interior of shared wall with Walk-in Cooler “C” to the interior of south wall shared with Freezer “A” and 12’7-13/16” on the front (east) wall inclusive of door by 13’5-1/6” interior across (front to back; south wall shared with Freezer “A”) and 10’7” (front to back; north wall shared with Cooler “C”). Notched area around column measures 3’-3-3/4” (north to south) by 2’-10-1/8” (east to west).

Shared exterior back wall (inclusive of walls) for Units “A” and “B” measures 30’ 8-1/2”.

Walk-In Freezer “A” / Cooler “B”, Size and Shape as per plans, including:

Installation. Assembly to be installed by a Factory Authorized Installer. Factory representative to provide written confirmation that walk-in was installed per manufacturer’s recommendations.
Prison Package to be provided as required.
Warranty: Ten (10) years panel warranties.
Interwiring by Others: All Interwiring of temperature monitor panel to master building alarm system or to the Owner’s network by others. All interfacing of alarm system and with the building

alarm system.
Temperature Monitors to be located above finished floor at 4'-0".
Diamond tread plate (WAINSCOT), 3'-0" high at exposed surfaces. Fasten to wall with non-exposed fasteners.
Note: (CONCEALED CONDUIT) All electrical is to be concealed within the walls or located above the ceiling.

Partitions

- Fabrication and finish of partition walls shall be the same as the walk-in walls and shall lock into wall, ceiling, and/or floor panels, with Posi-Loc assemblies. Tongue and groove foam fabrication shall provide the thermal break between cooler and freezer compartments. Wall "T" panels shall be 23" x 12" symmetrical tee. Heater wires not required.

NSF

- All walk-ins shall be fabricated to comply with National Sanitation Foundation No. 7. The NSF label shall be affixed to the interior door pan. All interior corners, including floor shall be coved.

Air Vent

- An air vent shall be provided to equalize pressure between the interior and exterior, caused by sudden temperature changes due to door openings and evaporator defrosting. The vent shall be heated to prevent moisture and/or frost accumulation (required for freezers).

Insulation

- Each panel shall be filled with rigid "Foamed-In-Place" urethane with a flame spread of 25 or less and smoke developed of 450 or less as well as having a 97% closed cell structure and the following thermal resistance:
  For coolers (reported at 55 F mean temperature)
  4" thick: R-29
  For freezers (reported at 20 F mean temperature)
  4" thick: R-32
  4" floor: R-29 (floors are measure 4" at the cap/rail and 3-5/8" everywhere else due to cove)

Panel locking assemblies

- Assembly of walk-in shall be accomplished by Posi-Locs. Posi-Locs shall be foamed-in-place and activated by a hex wrench provided by the manufacturer. Access ports to locking devices shall be covered by snap caps. Access ports shall be on interior to allow assembly of walk-in from the inside.

Section gaskets

- NSF listed gaskets shall be foamed-in-place to the male side of all panels, on both interior and exterior. Gaskets shall be impervious to stains.

Floor Construction

- Floor Panels: Panels shall be fabricated similar to other panels, designed to readily withstand uniformly distributed loads of 700 lbs. per square foot. Floor will be recessed to be flush with kitchen floor. Floor will not be covered by the tile and grout, or concrete wearing floor. Provide diamond tread flooring per above.

Drain Lines

- Installing contractor shall provide suitable drain lines from all evaporators. Drains shall be trapped outside the walk-in. Freezer drains shall be copper tubing and shall be heated and insulated to prevent freeze-up. All plumbing to be in accordance with local codes. Drain line heater kits available from Kolpak in 6', 2' or 18' lengths.

Walls

- 4" Class 1 - Foamed in place Urethane. Interior walls to be Galvalume - Embossed White 26Ga. Exterior: Exposed to be 20 gauge 304 stainless steel and the unexposed is Galvalume 26 gauge.

Factory floors –

- Aluminum Diamond Tread .100. Verify recess with drawings. Secure floor to wall assembly

with cam-lock assembly. KEC to ensure the floor assembly is level prior to the wearing bed installation.

Doors

- Two (1) 34" doors. Doors to be 20-gauge stainless steel, type 304 (18-8), #4 finish, with heated perimeter / door jambs / windows and threshold heaters. Each door to be equipped with 3'-0" high diamond tread kick plate on both sides of doors. Provide door bumper at doors.
- Each walk-in shall be fitted with one standard 34" x 78" swing-type entrance door. The door shall be flush type, finished in and out to match the wall in which located. Doors and door section shall be listed by Underwriters Laboratories and equipped with the following:
- Door shall be equipped with magnetic gasket, Posi-Seal door closure (,) and latch. Hardware has provisions for locking and a safety release which prevents entrapment of personnel within the box(.)
- Door shall be self-closing with two strap-type, cam-lift hinges.
- Door jamb shall be made of Fiberglass Reinforced Plastic. An isolated, low wattage heater strip covered by magnetically attracting stainless steel shall be fitted onto this jamb (required in freezers) strip shall provide perfect sealing of magnetic gasket and prevent frost and condensation build-up.
- Each entrance door section shall be provided with an LED type vapor-proof light with safety pilot light that stays on when light switch is turned off, light switch (,) and conduit between switch box and outlet box. Concealed wiring shall be standard on each entrance door section.
- A threshold with non-skid striping shall be provided with each door section. Heater wire shall continue beneath the threshold (required in freezers)
- A 2" dial thermometer shall be included with each door section to indicate inside temperature.

Door Accessories –

Air Shield on Cooler Door only, none required on Freezer Door.
Thermometer - 2-inch Dial w/6' Lead (STD)
Vent - Pressure Relief, Heated Kason 1825 (STD)
Threshold, FRP
Heater Wire, 2.5 Watt / FT
Door Closer with Tamperproof Screws - Kason 1094 Polished Chrome Latch with Tamperproof Screws –
Kason 57 Deadbolt (HANDLE)
Light Fixture w/Tamperproof Screws - Kason 1808NM LED
Hinge with Tamperproof Screws - Dent 310S (Spring Assist) S/S Polished

Safety Light switches - Four (4) three-way hyplon light switches with pilot lights.
Trim - Match exterior finish and trim where adjacent at walls and ceilings.
Lights - Freezer One (1) lot LED light fixtures with T8 temperature ballasts to operate in temperatures to -20 F. Refrigerator to have one (1) lot of LED light fixtures. (1809LED COMPARTMENT LIGHT)

Field Measurement is required prior to construction. Provide fabricated drawings for approval by Consultant prior to manufacture. Complete Assembly and Installation by Certified Installer. Electrical connection by General Contractor. Position at location per plans. Operational training will be provided to the user.

Item #2 **Provide (1) Walk-in Cooler "C", KolPak, Custom Model (as specified below):**

Cooler Unit "C" will measure 24' 9-1/2" from exterior of shared wall with Walk-in Cooler "C" (inclusive of wall) to the exterior of south wall shared with Cooler "B" (inclusive of wall) by 13'5" across (front to back; inclusive of walls).

Walk In Cooler "C" - Size and Shape as per plans, including:

Installation. Assembly to be installed by a Factory Authorized Installer. Factory representative to provide written confirmation that walk-in was installed per manufacturer's recommendations.

Prison Package to be provided as required.

Warranty: Ten (10) years panel warranties.

Interwiring By Others: All Interwiring of temperature monitor panel to master building alarm system or to the Owner's network by others. All interfacing of alarm system and with the building alarm system.

Temperature Monitors to be located above finished floor at 4'-0".

Diamond tread plate (WAINSCOT**),** 3'-0" high at exposed surfaces. Fasten to wall with non-exposed fasteners.

Note: (CONCEALED CONDUIT**)** All electrical is to be concealed within the walls or located above the ceiling.

Partitions

- Fabrication and finish of partition walls shall be the same as the walk-in walls and shall lock into wall, ceiling, and/or floor panels, with Posi-Loc assemblies. Tongue and groove foam fabrication shall provide the thermal break between cooler and freezer compartments. Wall "T" panels shall be 23" x 12" symmetrical tee. Heater wires not required.

NSF

- All walk-ins shall be fabricated to comply with National Sanitation Foundation No. 7. The NSF label shall be affixed to the interior door pan. All interior corners, including floor shall be coved.

Air Vent

- An air vent shall be provided to equalize pressure between the interior and exterior, caused by sudden temperature changes due to door openings and evaporator defrosting. The vent shall be heated to prevent moisture and/or frost accumulation (required for freezers).

Insulation

- Each panel shall be filled with rigid "Foamed-In-Place" urethane with a flame spread of 25 or less and smoke developed of 450 or less as well as having a 97% closed cell structure and the following thermal resistance:
  For coolers (reported at 55 F mean temperature)
  4" thick: R-29
  For freezers (reported at 20 F mean temperature)
  4" thick: R-32
  4" floor: R-29 (floors are measure 4" at the cap/rail and 3-5/8" everywhere else due to cove)

Panel locking assemblies

- Assembly of walk-in shall be accomplished by Posi-Locs. Posi-Locs shall be foamed-in-place and activated by a hex wrench provided by the manufacturer. Access ports to locking devices shall be covered by snap caps. Access ports shall be on interior to allow assembly of walk-in from the inside.

Section gaskets

- NSF listed gaskets shall be foamed-in-place to the male side of all panels, on both interior and exterior. Gaskets shall be impervious to stains.

Floor Construction

- Floor Panels: Panels shall be fabricated similar to other panels, designed to readily withstand uniformly distributed loads of 700 lbs. per square foot. Floor will be recessed to be flush with kitchen floor. Floor will not be covered by the tile and grout, or concrete wearing floor. Provide diamond tread flooring per above.

Drain Lines

- Installing contractor shall provide suitable drain lines from all evaporators. Drains shall be trapped outside the walk-in. Freezer drains shall be copper tubing and shall be heated and insulated to prevent freeze-up. All plumbing to be in accordance with local codes. Drain

line heater kits available from Kolpak in 6', 2' or 18' lengths.
Safety Light switches - Four (4) three-way hyplon light switches with pilot lights.
Cooler Floors - Floorless: Provide 1-1/2" high or 4" high Temp-Guard vinyl screeds. Screeds must be coved on both sides and sit flat on the floor. Screeds shall be nailed or lag fasteners shall be allowed. Wall panels lock to screeds on 2'0" centers.
Doors

- One (1) 34" door. Door to be 20-gauge stainless steel, type 304 (18-8), #4 finish, with heated perimeter / door jambs and threshold heaters. Each door to be equipped with 3'-0" high diamond tread kick plate on both sides of doors. Provide door bumper at doors.
- Each walk-in shall be fitted with one standard 34" x 78" swing-type entrance door. The door shall be flush type, finished in and out to match the wall in which located. Doors and door section shall be listed by Underwriters Laboratories and equipped with the following:
- Door shall be equipped with magnetic gasket, Posi-Seal door closure, and latch. Hardware has provisions for locking and a safety release which prevents entrapment of personnel within the box(.)
- Door shall be self-closing with two strap-type, cam-lift hinges.
- Door jamb shall be made of Fiberglass Reinforced Plastic. An isolated, low wattage heater strip covered by magnetically attracting stainless steel shall be fitted onto this jamb (required in freezers). This strip shall provide perfect sealing of magnetic gasket and prevent frost and condensation build-up.
- Each entrance door section shall be provided with an LED type vapor-proof light with safety pilot light that stays on when light switch is turned off, light switch, and conduit between switch box and outlet box. Concealed wiring shall be standard on each entrance door section.
- A threshold with non-skid striping shall be provided with each door section. Heater wire shall continue beneath the threshold (required in freezers).
- A 2" dial thermometer shall be included with each door section to indicate inside temperature.

Door Accessories –
Air Shield
Thermometer - 2-inch Dial w/6' Lead (STD)
Vent - Pressure Relief, Heated Kason 1825 (STD)
Threshold, FRP
Heater Wire, 2.5 Watt / FT
Door Closer with Tamperproof Screws - Kason 1094 Polished Chrome Latch with Tamperproof Screws –
Kason 57 Deadbolt (HANDLE)
Light Fixture w/Tamperproof Screws - Kason 1808NM LED
Hinge with Tamperproof Screws - Dent 310S (Spring Assist) S/S Polished
Safety Light switches - Four (4) three-way hyplon light switches with pilot lights.
Trim - Match exterior finish and trim where adjacent at walls and ceilings.
Lights - Refrigerator to have One (1) lot LED light fixtures. (1809LED COMPARTMENT LIGHT)
Walls - 4" Class 1 - Foamed in place Urethane. Interior walls to be Galvalume - Embossed White 26Ga. Exposed to be 20 gauge 304 stainless steel and the unexposed is Galvalume 26

Field Measurement is required prior to construction. Provide fabricated drawings for approval by Consultant prior to manufacture. Complete Assembly and Installation by Certified Installer. Electrical connection by General Contractor. Position at location per plans. Operational training will be provided to the user.

Item #3 **Provide (1) Walk-in Cooler "D", KolPak, Custom Model (as specified below):**
Cooler Unit "D" will measure 16' 3-3/4" from interior of shared wall with Walk-in Cooler "C" to the exterior of north wall (inclusive of wall) by 10'10-1/4" across (front to back; inclusive of walls).

Walk In Cooler "D" - Size and Shape as per plans, including:

Installation. Assembly to be installed by a Factory Authorized Installer. Factory representative to provide written confirmation that walk-in was installed per manufacturer's recommendations.
Prison Package to be provided as required.
Warranty: Ten (10) years panel warranties.
Interwiring By Others: All Interwiring of temperature monitor panel to master building alarm system or to the Owner's network by others. All interfacing of alarm system and with the building alarm system.
Temperature Monitors to be located above finished floor at 4'-0".
Diamond tread plate (WAINSCOT**),** 3'-0" high at exposed surfaces. Fasten to wall with with non-exposed fasteners.
Note: (CONCEALED CONDUIT All electrical is to be concealed within the walls or located above the ceiling.

Partitions

- Fabrication and finish of partition walls shall be the same as the walk-in walls and shall lock into wall, ceiling, and/or floor panels, with Posi-Loc assemblies. Tongue and groove foam fabrication shall provide the thermal break between cooler and freezer compartments. Wall "T" panels shall be 23" x 12" symmetrical tee. Heater wires not required.

NSF

- All walk-ins shall be fabricated to comply with National Sanitation Foundation No. 7. The NSF label shall be affixed to the interior door pan. All interior corners, including floor shall be coved.

Air Vent

- An air vent shall be provided to equalize pressure between the interior and exterior, caused by sudden temperature changes due to door openings and evaporator defrosting. The vent shall be heated to prevent moisture and/or frost accumulation (required for freezers).

Insulation

- Each panel shall be filled with rigid "Foamed-In-Place" urethane with a flame spread of 25 or less and smoke developed of 450 or less as well as having a 97% closed cell structure and the following thermal resistance:
  For coolers (reported at 55 F mean temperature)
  4" thick: R-29
  For freezers (reported at 20 F mean temperature)
  4" thick: R-32
  4" floor: R-29 (floors are measure 4" at the cap/rail and 3-5/8" everywhere else due to cove)

Panel locking assemblies

- Assembly of walk-in shall be accomplished by Posi-Locs. Posi-Locs shall be foamed-in-place and activated by a hex wrench provided by the manufacturer. Access ports to locking devices shall be covered by snap caps. Access ports shall be on interior to allow assembly of walk-in from the inside.

Section gaskets

- NSF listed gaskets shall be foamed-in-place to the male side of all panels, on both interior and exterior. Gaskets shall be impervious to stains.

Floor Construction

- Floor Panels: Panels shall be fabricated similar to other panels, designed to readily withstand uniformly distributed loads of 700 lbs. per square foot. Floor will be recessed to be flush with kitchen floor. Floor will not be covered by the tile and grout, or concrete wearing floor. Provide diamond tread flooring per above.

Drain Lines

- Installing contractor shall provide suitable drain lines from all evaporators. Drains shall be trapped outside the walk-in. Freezer drains shall be copper tubing and shall be heated and

insulated to prevent freeze-up. All plumbing to be in accordance with local codes. Drain line heater kits available from Kolpak in 6', 2' or 18' lengths.

Safety Light switches - Four (4) three-way hyplon light switches with pilot lights.

Cooler Floors - • Floorless: Provide 1-1/2" high or 4" high Temp-Guard vinyl screeds. Screeds must be coved on both sides and sit flat on the floor. Screeds shall be nailed or lag fasteners shall be allowed. Wall panels lock to screeds on 2'0" centers.

Doors

- One (1) 34" door. Door to be 20-gauge stainless steel, type 304 (18-8), #4 finish, with heated perimeter / door jambs and threshold heaters. Each door to be equipped with 3'-0" high diamond tread kick plate on both sides of doors. Provide door bumper at doors.
- Each walk-in shall be fitted with one standard 34" x 78" swing-type entrance door. The door shall be flush type, finished in and out to match the wall in which located. Doors and door section shall be listed by Underwriters Laboratories and equipped with the following:
- Door shall be equipped with magnetic gasket, Posi-Seal door closure, and latch. Hardware has provisions for locking and a safety release which prevents entrapment of personnel within the box(.)
- Door shall be self-closing with two strap-type, cam-lift hinges.
- Door jamb shall be made of Fiberglass Reinforced Plastic. An isolated, low wattage heater strip covered by magnetically attracting stainless steel shall be fitted onto this jamb (required in freezers). This strip shall provide perfect sealing of magnetic gasket and prevent frost and condensation build-up.
- Each entrance door section shall be provided with an LED type vapor-proof light with safety pilot light that stays on when light switch is turned off, light switch, and conduit between switch box and outlet box. Concealed wiring shall be standard on each entrance door section.
- A threshold with non-skid striping shall be provided with each door section. Heater wire shall continue beneath the threshold (required in freezers).
- A 2" dial thermometer shall be included with each door section to indicate inside temperature.

Door Accessories –

Air Shield
Thermometer - 2-inch Dial w/6' Lead (STD)
Vent - Pressure Relief, Heated Kason 1825 (STD)
Threshold, FRP
Heater Wire, 2.5 Watt / FT
Door Closer with Tamperproof Screws - Kason 1094 Polished Chrome Latch with Tamperproof Screws –
Kason 57 Deadbolt (HANDLE)
Light Fixture w/Tamperproof Screws - Kason 1808NM LED
Hinge with Tamperproof Screws - Dent 310S (Spring Assist) S/S Polished

Safety Light switches - Four (4) three-way hyplon light switches with pilot lights.
Trim - Match exterior finish and trim where adjacent at walls and ceilings.
Lights - Refrigerator to have one (1) lot of LED light fixtures. (1809LED COMPARTMENT LIGHT)
Walls - 4" Class 1 - Foamed in place Urethane. Interior walls to be Galvalume - Embossed White 26Ga. Exposed to be 20 gauge 304 stainless steel and the unexposed is Galvalume 26

Field Measurement is required prior to construction. Provide fabricated drawings for approval by Consultant prior to manufacture. Complete Assembly and Installation by Certified Installer. Electrical connection by General Contractor. Position at location per plans. Operational training will be provided to the user.

Item #4 **Provide (LOT) Walk-in Cooler/Freezer Shelving, New Age (Models and Quantities below):**

New Age T-Bar Series shelving units are constructed of High tensile extruded aluminum,

Type 6063-T5 alloy. All units are heli-arc welded with all seams fully welded and sealed. Units have easy-to-clean flat surfaces that aid in the easy-on and easy-off of smaller heavy product. Approved for use in freezers, displays, as well as packaging and storage areas, these heavy-duty all welded aluminum racks keep product organized and off of the floor while providing adequate air flow. Prison approved. Each unit is equipped with adjustable feet (Model #0117) for easy leveling. With a weight capacity of 1000 pounds per shelf. Each unit has four shelves. New Age Shelving units feature a Lifetime Guarantee against rust and corrosion as well as a Five-Year Guarantee against material defects and workmanship.

Provide the following Models and Quantities for each Walk-in Cooler/Freezer as indicated:

Shelving units for Walk-in Freezer "A":
3 – Model #1068TB; dimensions: 24" D x 72" H x 72" L
2 – Model #1067TB; dimensions: 24" D x 72" H x 60" L
4 – Model #1066TB; dimensions: 24" D x 72" H x 48" L
1 – Model #1071TB; dimensions: 24" D x 72" H x 42" L
2 – Model #1062TB; dimensions: 20" D x 72" H x 48" L
1 – Model #1061TB; dimensions: 20" D x 72" H x 36" L

Shelving units for Walk-in Cooler "B":
2 – Model #1066TB; dimensions: 24" D x 72" H x 48" L
1 – Model #1065TB; dimensions: 24" D x 72" H x 36" L
4 – Model #1067TB; dimensions: 24" D x 72" H x 60" L
1 – Model #1061TB; dimensions: 20" D x 72" H x 36" L

Shelving units for Walk-in Cooler "C":
3 – Model #1062TB; dimensions: 20" D x 72" H x 60" L
1 – Model #1061TB; dimensions: 20" D x 72" H x 36" L
4 – Model #1068TB; dimensions: 24" D x 72" H x 72" L
5 – Model #1067TB; dimensions: 24" D x 72" H x 60" L
2 – Model #1066TB; dimensions: 24" D x 72" H x 48" L

Shelving units for Walk-in Cooler "D":
1 – Model #1062TB; dimensions: 20" D x 72" H x 48" L
1 – Model #1070TB; dimensions: 20" D x 72" H x 42" L
1 – Model #1063TB; dimensions: 20" D x 72" H x 60" L
3 – Model #1068TB; dimensions: 24" D x 72" H x 72" L
2 – Model #1067TB; dimensions: 24" D x 72" H x 60" L

Complete Assembly and Installation by Kitchen Equipment Contractor. Position at location per plans.

(Equal Supplier: Channel)

SECTION 22 01 00

GENERAL REQUIREMENTS FOR PLUMBING WORK

PART 1 - GENERAL

1.1 SCOPE

A. This project involves construction of the project as titled above with associated site work as shown on the plans and described herein.

1.2 DRAWINGS

A. Contract drawings are diagrammatic only and do not give fully dimensioned locations of various elements. Contractor shall determine exact locations from field measurements. Refer also to all architectural, structural, etc., drawings. The lack of specific detail of all offsets, transitions, etc., shall not relieve the Contractor of responsibility to provide such necessary elements to coordinate his work with building construction and with other trades.

1.3 SUBSTITUTION

A. All bids shall be based only on the equipment and materials as scheduled on the drawings and/or as specified, or on equivalent equipment and materials from a pre-approved alternative manufacturer. No bids may be based on a substitute or other alternative without specific written prior approval from the Engineer. Any Bidder who assumes equivalence of products and who bases his/her bid on that assumption, does so at their own risk.

B. A listing of approved alternative manufacturers does not mean that all products of a particular alternative manufacturer are acceptable alternatives to the scheduled items; it merely means that for bidding prior approval is not required. All fixtures and devices must still be submitted according to the prescribed procedures. In addition, some items that have an important visual affect, e.g. electric water coolers, may be required to receive Engineer's or Owner's approval also.

C. Substitute equipment, components, devices and systems shall be fully compatible with the design intent and complete with all required costs included in the bid amount. This includes all modifications to support, structure, pipe and electrical sizing and components needed and all other items necessary for the substitute to perform with no additional cost to the project.

1.4 INTENT

A. All equipment, materials and labor that may be necessary to complete work in accordance with the intent of these plans and specifications shall be furnished by the Contractor without additional cost.

B. All systems represented in the documents shall, unless specifically noted to the contrary, be provided and installed complete with all necessary components to form a complete and functioning system. Submission of bids will be considered confirmation that complete and functional systems have been included in the bids.

C. If any discrepancies or confusion is perceived in the documents, the Contractor shall call such to the attention of the Engineer for clarification of the documents prior to bidding or construction. If any inconsistencies or contradictions within the construction documents are discovered after the construction contracts are awarded, the Engineer shall determine the intent and correct interpretation of the construction documents.

D. Contractor shall supervise and direct the work competently and efficiently and in accordance with the drawings and specifications. Contractor shall be responsible for using construction means, methods, techniques, sequences, and procedures as are compatible with the project's requirements and will result in a project completed in accordance with the requirements of the drawings and specifications.

1.5 CODES, PERMITS AND FEES

A. Contractor shall comply with all local, state and national codes and shall pay for all applicable costs, fees and permits.

1.6 CONNECTION TO UTILITIES

A. Coordinate connections to utilities directly with utility providers.

B. Verify location, size, elevation, pressure, and any other pertinent data of existing utilities. Additional costs incurred due to a failure to verify such data and to coordinate associated work with respective utility providers shall be borne by Contractor.

C. All costs associated with providing utilities including, but not limited to, connection fees, boring under roads, etc., shall be included in the Contractor's bid price whether such costs are incurred by Contractor or charged by a utility company.

D. Submission of a bid by a Contractor shall be considered an acknowledgment by the Contractor of his compliance with this section.

E. Contractor shall connect water and waste piping and gas service to existing services in accordance with utility company regulations and shall pay all applicable fees and costs. NOTE: Excavate by hand and with caution to locate all utilities prior to machine excavation. Should any service be interrupted, Contractor shall repair it immediately and at no additional cost.

1.7 VIBRATION AND NOISE

A. Each of the various pieces of equipment shall operate without objectionable vibration or noise. All rotating equipment shall be statically and dynamically balanced and shall be mounted, supported, and fastened so that vibration shall not exceed levels specified for the equipment item. The specific type of vibration isolation to be installed shall be submitted to the Engineer for his approval.

B. If, in the opinion of the Engineer, objectionable vibration or noise or transmission thereof to the building occurs, the Contractor shall execute remedial measures as may be necessary to eliminate such unsatisfactory operating conditions and the work and material thereby required shall be furnished and performed at the Contractor's expense.

1.8 GUARANTEE

A. Each Contractor shall guarantee all labor and materials furnished by him for a period of one year unless otherwise noted. Guarantee period shall extend from the time of final written acceptance of the installation or upon usage by a written directive from the Owner, whichever occurs first. The guarantee shall cover the repair or replacement, without additional cost to the Owner, of any defective material or faulty workmanship.

1.9 SERVICE

A. All necessary service of each system, such as adjustment of controls, air distribution, and water balancing valves, mechanical repair of equipment, 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.

1.10 SAFETY

A. General
   1. Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the work, and Contractor shall comply with all laws governing safety, specifically the "Occupational Safety and Health Standards" and the "Safety and Health Regulations for Construction", state and federal.

B. Hazardous Chemicals
   1. According to OSHA, a hazardous chemical is any chemical which is a physical hazard or a health hazard. This may include items such as paints, solvents, adhesives, sealants, cleaners, etc. If a contractor produces, uses, or stores hazardous chemicals at the workplace, then contractor shall develop, implement, and maintain a hazard communication program in compliance with latest OSHA requirements. In projects with multiple tenants in which the building is partially occupied during the project, contractor shall inform the building manager or owner, according to OSHA guidelines, of any hazardous chemicals being produced, stored, or used in the building so that other tenants may be notified. Contractor shall employ required methods of training, information, handling, ventilation, labeling, storing, disposal, and removal of hazardous chemicals.

1.11 COORDINATION

A. Each Contractor's bid shall include the necessary detail and interconnection work to coordinate his work with the work of other trades. Failure on the part of the Contractor to coordinate with all other trades resulting in interferences shall be sufficient reason to require the Contractor to replace or rebuild the work involved at no extra charge.

1.12 STORAGE OF MATERIALS

A. Each Contractor shall provide temporary storage facilities suitable for equipment stored at the job site. Storage facilities shall be rain-proof and lockable as required. Materials or equipment stored on site but not in a lockable, rain-proof storage facility shall be stored above ground or above slab. Contractor shall take necessary precautions to prevent entry of and/or damage from dirt, trash, water, or vermin. Equipment not properly stored and protected shall be, at the discretion of the Engineer, replaced at no cost to Owner. Roofs are not acceptable storage areas unless specifically allowed in writing by the Engineer.

PART 2 - PRODUCTS

2.1 SUBMITTALS

A. Provide submittal to the A/E within 45 days of commencement of the Contractor’s agreement with the Owner.

B. In addition, submit specific information on equipment, products, and principal materials specified. Indicate and provide names of manufacturers, catalog and model numbers, cut sheets, and such other supplementary information as necessary for evaluation. Include all items mentioned by model number and/or manufacturer's name in the specifications or on the drawings, including but not limited to the following:
   1. Plumbing - Fixtures, piping systems, valves, insulation, equipment and other principal materials.
   2. Fire Protection - Devices, materials and layout of system.

C. Coordinate placement of components and equipment with other contractors to determine any conflicts and assure proper clearances. Prepare and submit large scale coordinated shop drawings (minimum ¼"= 1'-0") of the central mechanical room, central electrical room and each individual electrical room. These drawings shall show to scale the actual sizes of each piece of selected mechanical, plumbing and electrical equipment along with the required clearances for maintenance or removal/replacement. Provide bottom of pipe, duct, equipment or other such vertical obstructions. Provide sections where necessary and as requested by the Engineer for clarity to describe equipment heights, piping elevations and other such clearance issues. Drawings shall be prepared on maximum 30" X 42" sheets using AutoCad® 2014 format. Submit 6 copies of the drawing sheets and a compact disk with the drawing files.

D. Requirements for submittal
   1. Each submittal shall:
      a. bear a stamp or specific written indication that Contractor has reviewed and approved all submittals prior to submission to Engineer,
      b. have all information deleted by Contractor that pertains to the means and methods of construction or to the fabrication, assembly, installation, or erection process (approval by Engineer shall not extend to these areas unless specifically noted by Engineer),
      c. be clearly marked as to which specific piece of equipment is being submitted, by use of a permanent marker, stamp, etc., so as to distinguish it from other pieces of equipment that may occur on the same page,
      d. be clearly marked as to which available options are being submitted that are associated with a piece of equipment, and
      e. be complete with respect to quantities, dimensions, specific performance, materials, and similar data to enable Engineer to review the proposed equipment.
   2. Omission by Contractor of any of the above requirements for submittals will subject submittal to automatic rejection without review.
   3. Any submittals received by Engineer that were not requested shall be returned without review of any kind.

E. Substitutions
   1. Reference Section 01 60 00.
   2. In Addition, no substitution is allowable without Engineer's written approval ten days prior to bid due date (unless otherwise allowed by Engineer) unless the manufacturer is listed on the Drawings or in the specifications as being a pre-approved alternative manufacturer. Any submittal received without such written approval or prior approval is subject to unqualified rejection.
   3. Contractor's responsibility shall be to verify that submitted substitute equipment will fit in the space available. The Contractor's submittal for acceptance of the substitute shall include a written statement of whether or not such acceptance would require any subsequent or associated changes to the drawings or specifications. Any such changes shall be described in writing, briefly but completely.
   4. The Contractor shall be responsible for the cost of any such modifications due to substitution of materials or equipment for that which was specified or scheduled. The cost shall be complete, that is, it shall include the costs affect on any and all other trades.
   5. The Engineer may request shop drawings of mechanical rooms or systems of the substituted equipment.

F. Installation Instructions
   1. For certain products or systems as identified in subsequent specification sections, the Contractor shall, as required, provide copies of manufacturer's installation instructions with the submittal. When required as such, the installation instructions are considered part of the submittal and their omission may result in automatic rejection of the submittal. Where more than one identical devices are scheduled, only one set of installation instructions needs to be submitted, e.g. if seven five-ton split system air conditioners are scheduled, only one five-ton unit installation instructions needs to be submitted. Similarly, if one set of installation instructions is identified by the manufacturer and on the

instructions to be applicable to more than one type or size of devices, e.g. if one set of air conditioner instructions is good for three, four, and five-ton units, then only one instruction set is required for those devices.

2.2 MATERIALS

A. All materials shall be new and of the quality specified. Materials shall be free from defects. Where manufacturers' names are mentioned in these specifications or on the plans, it has been done in order to establish a standard of quality and construction.

B. Contractor will be responsible for transportation of his materials to and on the job, and will be responsible for the storage and protection of his materials and work until the final acceptance of the job. At the end of each work day, each Contractor is responsible for covering or protecting his work or materials that may be susceptible to damage even if such damage is the result of unforeseen causes, e.g. an overnight thunderstorm. Failure to do so will be sufficient cause for rejection of any item in question, and any such item shall be replaced at Contractor's expense.

C. Contractor shall verify that all pieces of equipment will fit through available openings in building and that all equipment can be installed without modification of building structure.

2.3 LABELING

A. Each device for which an independent testing authority has established a standard shall have affixed a label indicating its compliance and listing. Such independent testing authorities shall include, but not be limited to, the following:

A.D.C.	Air Diffusion Council
A.G.A.	American Gas Association
A.M.C.A.	Air Movement and Control Association
A.N.S.I.	American National Standards Institute
A.R.I.	Air-Conditioning and Refrigeration Institute
A.S.H.R.A.E.	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
A.S.M.E.	American Society of Mechanical Engineers
A.S.P.E.	American Society of Plumbing Engineers
A.S.S.E.	American Society of Sanitary Engineers
A.S.T.M.	American Society for Testing and Materials
A.W.W.A.	American Water Works Association
C.T.I.	Cooling Tower Institute
F.M.	Factory Mutual
I.A.P.M.O.	International Association of Plumbing and Mechanical Officials
I.C.B.O.	International Conference of Building Officials
M.S.S.	Manufacturers Standardization Society of the Valve and Fittings Industry
N.A.P.H.C.C.	National Association of Plumbing, Heating, Cooling Contractors
N.B.S.	National Bureau of Standards
N.E.B.B.	National Environmental Balancing Bureau
N.E.C.	National Electric Code
N.E.M.A.	National Electrical Manufacturers Association
N.F.P.A.	National Fire Protection Association
N.R.C.A.	National Roofing Contractors Association
N.S.F.	National Sanitation Foundation
P.D.I.	Plumbing and Drainage Institute
S.B.C.C.I.	Southern Building Code Congress International
S.M.A.C.N.A.	Sheet Metal and Air Conditioning Contractors' National Association
T.I.M.A.	Thermal Insulation Manufacturers Association
U.L.	Underwriters Laboratory

2.4 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Contractor shall prepare and provide four copies of operating and maintenance manuals. Contractor shall deliver these four bound sets to the Engineer for approval. Each manual shall be in a ring binder and shall be indexed with dividers for each section. Delivery of required documents is a condition of final acceptance.

B. Each manual shall contain at least the following:
   1. Certificates of acceptance from inspecting authorities,
   2. Waiver of all liens,
   3. For each piece of equipment:
      a. operating and safety instructions, service manuals, and parts lists applicable to each item of equipment furnished (Contractor shall clearly distinguish in the manual between information that pertains to the particular equipment and information which does not.),
      b. nameplate data and design parameters for equipment,
      c. name, phone number, and address of vendor, manufacturer's representative, and warrantee provider,
      d. start-up report, if applicable,
   4. copies of all shop drawings and as-built drawings (as-built drawings shall be on a reproducible vellum as produced by a xerox or photographic process),
   5. copies of all approved submittals,
   6. warranties with start dates and end dates for each piece of equipment and/or for each system (warranties shall begin on date of substantial completion and acceptance by Owner),
   7. names, phone numbers and addresses of all subcontractors, vendors, manufacturer's representatives, and warrantee providers,
   8. certification letter from each Contractor that each system furnished and installed by that Contractor and/or Subcontractors is started-up, balanced, adjusted and checked for proper operation in accordance with the intent of the contract documents, and
   9. acceptance letter from each Contractor with blanks for date of acceptance and date of expiration of warranties and guarantees.

2.5 TAGGING

A. Equipment to be Tagged: Each major piece of equipment discussed in the specifications or scheduled on the drawings shall have affixed a tag showing the name or function of that piece. The list of equipment to receive tags shall include, but not be limited to, the following:
   1. valves,
      a. tag shall indicate function such as "domestic cold water shut-off", "domestic hot water shut-off", "chilled water shut-off", etc.,
      b. tag may be attached with brass chain,
      c. exceptions that need no tag:
         (1) shut-off valves near to and serving only one device such as a plumbing fixture,
         (2) isolation valves located at or near the device being isolated,
   2. All piping shall be identified as specified elsewhere in these documents.
   3. All major pieces of equipment.
   4. Items which have no unique name, such as air devices, plumbing fixtures, lights, etc., need not have tags.

B. Tags
   1. Material - Tags shall be engraved plastic, brass, or anodized aluminum. Surface mounted tags shall have pressure sensitive adhesive backing. Tags for outdoor use shall be mounted with brass screws.
   2. Lettering - Characters shall be minimum 1/4" in height and shall be of a contrasting color to the tag.

3. Installation - Surface mounted tags with adhesive backs shall be applied only to clean, dry surfaces. Adhesive tags shall not be applied to surfaces that are subject to condensation or excessive heat.

C. Alternatives
1. For larger equipment such as large air handlers, switchgear, etc., the use of manufactured stencils (2 inch characters) and spray paint (in contrasting color to equipment) is an acceptable alternative.
2. Individual adhesive letters are not acceptable.
3. Other alternatives are acceptable only by submitting samples or manufacturer's literature to Engineer and receiving written permission.

PART 3 - EXECUTION

3.1 WORKMANSHIP

A. The workmanship shall, in all respects, be of the highest grade, and all construction shall be done according to the best practices of the trade. Piping, ducting and conduit shall be concealed unless otherwise noted, and installed square to the building lines. Any work not meeting this requirement shall be replaced or rebuilt without extra expense to the Owner.

3.2 INTERIM CLEANING

A. The Contractor shall maintain the work area in a clean condition during the course of the work. All debris, scrap and surplus material shall be removed from the work area on a periodic basis with a minimum of at least once per day.

B. All stored material shall be support above floor level and be protected from becoming damaged or dirty.

C. All installed material shall have open ends closed and protected from entrance of foreign material during construction.

D. Prior to enclosing an area such as a ceiling or chase wall, the installed material and surrounding area shall be thoroughly cleaned. After removing loose material, the area shall be vacuum cleaned or blown out with a portable blower to remove dust from surfaces.

3.3 CUTTING, PATCHING, AND PENETRATIONS

A. No joists, beams, girders, columns, slabs, or other structural elements shall be cut, drilled, or altered in any way by the Contractor without first obtaining written permission and instructions from the Engineer.

B. Where cutting any non-structural element(s) of walls, floors or ceilings is necessary to permit the installation of any work under this contract, or to repair any defects that may appear up to the expiration of the guarantee, such cutting shall be done by Contractor with as little damage as reasonably possible to the element being cut, to adjacent elements, or to the work of other trades.

C. After the necessary work has been completed, the damage shall be repaired by the Contractor, who shall pay all costs of such cutting and patching. All patching or sealing of cuts, penetrations, etc., including final appearance of same, shall be done to the approval of the Engineer. In absence of specific finish instructions, provide finish to match adjacent surfaces.

D. Where a penetration or cutting of a ceiling, wall, or other building membrane is required or made, each such penetration or cut shall be made neatly with a cutting tool such as a saw, sharp knife, etc., and not with an impact tool such as a hammer, screwdriver, wrench,

crowbar, etc. Each such penetration or cut shall be no larger than reasonably necessary, and penetrations in occupied or publicly accessible spaces shall have a chrome-plated escutcheon installed large enough to cover the entire opening.

E. Where a penetration is made in a fire-rated building assembly (wall, floor, ceiling, floor-ceiling, roof-ceiling, etc.) or in a membrane of a fire-rated assembly, and no specific firestopping assembly is shown on Drawings, Contractor shall provide and install a firestopping assembly or product as listed in the latest edition of U.L. Fire Resistance Directory. Firestopping assembly or product shall be appropriate for the size and material of the penetrating element, for the penetrated building element, for the presence or lack of insulation, for the size of the annulus around the penetrating element, etc.. Contractor shall include firestopping assembly or product in submittals. Contractor shall review and verify fire-ratings of building assemblies as shown on Architectural plans. Lack of knowledge of a fire-rating of an building assembly shall not relieve Contractor of requirement to install firestopping.

3.4 EQUIPMENT AND PIPING SUPPORTS

A. All supporting systems for piping, equipment, and materials supported by the building structure shall be submitted to the Engineer for approval prior to purchase and installation.

B. Provide 3-1/2” (minimum, or as called out elsewhere) high concrete house keeping pads for all floor mounted equipment piping. Pad shall have chamfered edges and be painted to match the floor.

3.5 ACCESSIBILITY

A. Access Panels
   1. Access panels shall be provided wherever necessary for possible future replacement, adjustment, or maintenance of operating devices such as machinery, valves, dampers, switches, relays, etc., or to other critical non-operating devices such as pull boxes, inspection parts, gauges, etc. Such access panels shall be provided and installed by Contractor, whether or not shown on drawings, and shall be brought to the attention of Engineer for his approval of type, color, etc. Where access is provided in rated members, the access panels shall be of a type that maintains the integrity of the member penetrated.

B. Access to Equipment
   1. All pipes, tubing, conduit, etc., including, but not limited to, chilled water and heating water piping, domestic cold water and hot water piping, fire sprinkler piping, waste and vent piping, drain piping of any type, electrical conduit, wiring not in conduit, and pneumatic control tubing shall be installed in such a way so as not to prevent and/or not to make unreasonably difficult the removal, operation, use, or maintenance of equipment, access panels or doors, pathways (especially in attics or crawl spaces), observation ports, measurement or balancing devices, junction boxes, etc.. If access for these purposes is prevented or made unreasonably difficult in the opinion of the Engineer, then the Contractor shall make modifications or repairs at no cost to anyone except the Contractor. Such modifications or repairs shall be considered neither complete nor adequate until the Engineer are satisfied that access for the above purposes is achieved.

3.6 FIELD REPORTS

A. The Contractor shall be required to respond all deficiency items noted in Field, Site Visit, Punch List and other such reports provided by the A/E. The response shall address each deficiency item in the same order as the report with annotations as to what was done to remedy the deficiency, who performed the work and when it was done.

3.7 OPERATING TESTS

A. General
   1. After all mechanical and electrical systems have been completed and put into operation, Contractor shall subject each system to an operating test under design conditions to ensure proper sequence and operation throughout the range of operation. All associated costs of such tests, including labor, fuel, apparatuses, piping, etc., shall be borne by the Contractor.
   2. Contractor shall make adjustments as required to ensure proper functioning of all systems. Special tests on individual systems are specified under individual sections. The Contractor shall return to the project during the first year and in the opposite season from which the system was initially operated and shall check the proper operation of the mechanical and electrical systems. Contractor shall perform any adjustments or corrective procedures required for the proper operation of all systems.

B. Notification
   1. Contractor shall give the Engineer seven days' prior notification of any test so that the Engineer will have time to be present if he so desires.

C. Reports
   1. After each test is performed, the Contractor who performed the test shall prepare and issue a report to include the following information:

      a. Project name and location, date of the report,
      b. Contractor's name, address, and telephone number; if the Contractor performing the test is a Subcontractor, indicate also for whom the test is being performed, their name, address, telephone number, and a contact person's name,
      c. the date, or range of dates, of the test,
      d. the name of the Contractor's employee who was responsible for performing or for overseeing the performing of the test,
      e. a brief description of the system being tested,
      f. a brief description of the testing procedure,
      g. a summary of the test result(s),
      h. a brief assertion that the system was tested as stated and that the system complied with the requirements of the contract documents or those of the Authority Having Jurisdiction, whichever is the most stringent, and
      i. a hand-written date and signature of someone who has authority or responsibility from the company that performed test(s), and a hand-written brief note stating that the above information is true and accurate.
   2. If the tested system is tested in parts, then one report may be made after the last part is tested.
   3. The report shall be issued to the Engineer within five working days after the test is completed.
   4. Such reports shall be required of all mechanical or electrical systems which require tests for pressure, water tightness, flow, resistance, or conductivity.

D. Services of a Manufacturer's Representative
   1. Reports: For all major systems or equipment required by subsequent specifications sections to have tests or inspections by a manufacturer's representative, the manufacturer's representative shall prepare a written report to be sent to the Engineer for subsequent distribution to the Engineer, Owner, General Contractor, and to whomever else the Engineer deems necessary. The report shall include at least the following:
      a. date of the visit, name and title of the representative, name and location of the project,
      b. name and title of any observers,
      c. a brief description of the equipment being inspected and/or tested,
      d. a brief discussion of the quality of the installation including any important items (in the manufacturer's experience) that were done correctly, as well as any items that were done incorrectly or not to recommendations,
      e. a list of tests and/or inspections performed and the results of same, and

f. a brief statement of whether the installation conforms to manufacturer's recommendations and/or requirements, and if not what is required to bring the installation into conformance.

2. Deficiencies and Defects
   a. Contractor shall be responsible for providing all labor and materials, at no cost to anyone except Contractor, to correct any deficiencies or defects reported by manufacturer's representative.
   b. If, in the opinion of the manufacturer's representative, the deficiencies and defects are sufficiently serious, then Contractor shall arrange for, and bear all costs of, another inspection by manufacturer's representative after corrective measures have been taken.
3. The above process shall continue until the manufacturer's representative approves the installation.

3.8 INSTRUCTIONS FOR OWNER

A. Contractor shall instruct the Owner's operating personnel in the operation and maintenance of all mechanical equipment. Contractor shall furnish any special servicing tools required for maintenance.

3.9 DEMONSTRATION

A. Contractor shall conduct a demonstration of the installation upon completion of the work. Prior to this, all work shall have been completed, tested, balanced, and placed in operation. Qualified persons must be present at demonstration to operate all systems and prove the performance of the equipment. The schedule for this demonstration shall be coordinated with the Engineer.

3.10 CLEANUP

A. At substantial completion of the project, thoroughly clean all equipment and systems of all dirt, debris and foreign material.

B. This shall include cleaning coils and fans inside of air handlers, cleaning the interior of duct systems and wiping down the interior of all electrical equipment.

END OF SECTION

SECTION 22 05 05

PIPES, FITTINGS AND VALVES FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SCOPE

A. Section Includes: Pipe and pipe fittings for the following systems:
1. Domestic water piping within 5 feet of building
2. Sanitary sewer piping within 5 feet of building
3. Storm water piping within 5 feet of building
4. Gas Piping
5. Valves
6. Water hammer arrestors
7. Flashings
8. Escutcheons
9. Unions and flanges
10. Gauges
11. identification
12. Underground pipe markers
13. Bedding and cover materials

1.2 REFERENCES

A. Codes: Provide plumbing piping systems laid out and installed in accordance with the local plumbing codes.

B. Standards: Where national or industry standards are referenced, provide materials and equipment certified by the manufacturer to be in conformance with latest issue of such national standards. Conform to the following standards:

1. American National Standards Institute (ANSI):
   a. A112.21.1M Floor Drains
   b. A112.21.2M Roof Drains
   c. A112.36.2 Cleanouts
   d. B16.12 Cast Iron Threaded Drainage Fittings
   e. B16.18 Cast Copper Alloy Solder Joint Pressure Fittings
   f. B16.22 Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
   g. B16.23 Cast Copper Alloy Solder Joint Drainage Fittings
   h. B16.29 Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings
   i. B16.32 Cast Copper Alloy Solder Joint Fittings for Solvent Drainage Systems
   j. B31.3 Chemical Plant and Petroleum Refinery Piping,
2. American Society for Testing and Materials (ASTM):
   a. A 47 Standard Specification for Ferritic Malleable Iron Castings
   b. A 53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded Seamless
   c. A 74 Standard Specification for Cast Iron Soil Pipe Fittings
   d. A 183 Standard Specification for Carbon Steel Track Bolts and Nuts
   e. A 216/A 216M Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding for High-Temperature Service
   f. A 276 Standard Specification for Stainless and Heat-Resisting Steel Bars

and Shapes
g. A 307 Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
h. A 536 Standard Specifications for Ductile Iron Castings
i. B 32 Standard Specification for Solder Metal
j. B 43 Standard Specification for Seamless Red Brass Pipe, Standard Sizes
k. B 61 Standard Specification for Steam or Valve Bronze Castings
l. B 62 Standard Specification for Composition Bronze or Ounce Metal Castings
m. B 75 Standard Specification for Seamless Copper Tube
n. B 88 Standard Specification for Seamless Copper Water Tube
o. B 306 Standard Specification for Copper Drainage Tube (DWV)
p. B 584 Standard Specification for Copper Alloy Sand Castings for General Applications
q. C 62 Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale)
r. C 478 Standard Specification for Precast Reinforced Concrete Manhole Sections
s. C 564 Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings
t. D 1785 Standard Specification for PVC Plastic Pipe, SCH 40, 80, and 120
u. D 2000 Standard Classification System for Rubber Products in Automotive Applications
v. D 2467 Standard Specification for PVC Plastic Pipe Fittings

3. American Water Works Association (AWWA):
a. C111/A21.11 Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
b. C110/A21.10 Ductile-Iron and Gray-Iron Fittings, 3 in. Through 48 in., for Water and Other Liquids
c. C606 Grooved and Shouldered Joints
4. Cast Iron Soil Pipe Institute (CISPI):
a. 301 Hubless Cast-Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications
b. 310 Patented Joint for Use in Connection with Hubless Cast-Iron Sanitary System
5. Federal Specifications (FS):
a. RR-F-621 Frames, Covers, Gratings, Steps, Sump and Catch Basin, Manhole
6. Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS):
a. SP 70 Cast Iron Gate Valves, Flanged and Threaded Ends
b. SP 71 Cast Iron Swing Check Valves, Flanged and Threaded Ends
c. SP 80 Bronze Gate, Globe, Angle and Check Valves
d. SP 84 Steel Valves - Socket Welding and Threaded Ends
e. SP 85 Cast Iron Globe and Angle Valves Flanged and Threaded Ends
7. Plumbing and Drainage Institute (PDI):
a. G101 Testing and Rating Procedure for Grease Interceptors
b. WH201 Water Hammer Arrestors

1.3 SUBMITTAL

A. Manufacturer's Data: Submit standard manufacturer's published product literature for materials and equipment proposed for use under this Contract, including the following items:

1. Fixtures – all types
2. Soil pipe and fittings.
3. Roof drainage pipe and fittings.
4. Domestic water pipe and fittings.
5. Drainage piping and fittings.
6. Jointing methods and materials for all piping systems.
7. Valves - all types.
8. Traps - all types.
9. Wall hydrants.
10. Water hammer arrestors.
11. Access panels.
12. Identification products
13. Hanger and support products

1.4 DELIVERY, STORAGE AND HANDLING

A. Furnish piping with temporary inlet and outlet caps until installation.

B. Store materials material in dry location elevated above floor and protected from entry of debris, dirt and mud

PART 2 - PRODUCTS

2.1 GENERAL

A. Piping materials shall be in conformance with details shown on the Drawings or as specified in the Pipe Specifications in this Section. Valves shall be as specified or approved equivalents. Unless otherwise specified, valve packing shall be the manufacturers standard for the intended service.

B. Close or butt nipples and bushings are not permitted.

C. Pipe size changes shall be made with bell reducers.

D. Bullhead or splitter tees are not permitted.

2.2 PIPING MATERIALS

A. Domestic Water
   1. General - No water piping shall be smaller than 3/4" except at points of connections to individual fixtures or if shown otherwise.
   2. Type "L" hard drawn copper pipe with solder type wrought copper joined with 95/5 solder. Solder shall contain no lead.
   3. At Contractor's option, sizes 4 inches and above may be ductile iron with mechanical joints.

B. Condensate Drain - Type M hard copper with solder type wrought copper fittings.

C. Gas Piping
   1. Above ground - Schedule 40 steel with screwed malleable fittings.
   2. Below ground – Within 5’-0” of building - Schedule 40 Steel with screwed fittings. Tape wrap with 2 coats of PVC tape and provide 5 pound bag type anode cadwelded to steel pipe.

D. Sanitary, Waste, Drain, Vent And Storm Drain Piping

   1. Soil Pipe Above Ground:

      a. 3 inch diameter and larger: Standard weight cast iron pipe with cast iron hubless pipe and fittings with CISPI 301 fittings and CISPI 310 coupling joints.

b. 2-1/2 Inches and Smaller: Cast iron or copper waste lines.
(1) Do not use copper for urinals.
c. Provide cast iron hubless pipe and fittings conforming to CISPI 301 with CISPI 310 coupling joints.
d. Provide ASTM B 306 copper tubing with ANSI B16.23, ANSI B16.29 or ANSI B16.32 solder joint fittings using ASTM B 32 lead free solder.

2. Soil Pipe, Below subsurface:
a. Schedule 40 PVC (solid wall pipe) ASTM D1785 with solvent joint DWV fittings. Foam Core pipe is unacceptable.
b. Any drainage fixture that may accept hot fluid greater than 130 degrees F. shall be cast iron for the first 10'-0" beyond the inlet. This includes drainage fixtures for steam condensate, water heater and boiler temperature or pressure reliefs and circulating heating (hydronic) water relief valves.

2.2 FLASHING

A. General: Provide sheet lead flashing, not less than 4 pounds per square foot, or other approved flashing material certified by the roofing system manufacturer to be compatible with the roofing system

2.3 VALVES

A. General
1. All valves installed in pipes that are to receive insulation shall have provisions to accommodate the insulation, such as extended length bonnets or handles, without compromising the insulation in anyway (such as reducing its thickness, compressing it, etc.).

B. Plumbing
1. Shut-off - Apollo, Hammond, Jomar, Nibco, Watts, or approved equivalent
a. Up through 2" - Ball valve, two-piece brass body, chrome-plated ball with brass stem, threaded connections, full port, Apollo 77-100, Hammond 8301, Jomar T-100, Nibco T-585-70, Watts B-6080
b. 3" through 4" - Ball valve, brass body, full port, chrome-plated ball with brass stem, Fed. Spec. WWV-35B, Jomar T-100-711 or approved equivalent
2. Check
a. Up through 2" - in-line, spring loaded, bronze body, threaded with thread-to-sweat adapter, Nibco T-480-Y, Watts 600
b. 2-1/2" and up - spring loaded wafer check, iron body, bronze mounted, flanged ends, aluminum bronze disc, EPDM seats, stainless steel spring and hinge pin, Stockham WG-970, Nibco W-920-W
3. All valves installed underground shall be installed in a concrete valve box with a cast iron cover unless noted otherwise. Box cover shall have the service, e.g. "water" or "gas" cast into metal.
4. High Purity Water systems – Stainless steel full port ball valves with threaded connections. Same style and manufacturer as plumbing ball valves.
5. Domestic Hot Water Return
a. Provide self-contained, fully automatic, thermally actuated stainless steel valve factory set at 105 degrees F.
b. Provide ball type isolation valves and union.
c. ANSI/AWWA C800 compliant.
d. Circuit Solver by ThermOmegaTech.

2.4 WATER HAMMER ARRESTORS

A. Provide water hammer arrestors that are listed and in compliance with Plumbing & Drainage Institute Standard PDI-WH 201, latest edition.

2.5 PRESSURE REDUCING VALVES and TEMPERATURE REGULATING VALVES

A. Provide as scheduled on the drawings.

2.6 ESCUTCHEON PLATES

A. Contractor shall provide and install escutcheons around all pipes passing through walls, ceilings, cabinets, and floors in finished areas. Escutcheon shall be chrome-plated cast brass with set screw.

B. Caulk escutcheons to surface with appropriate material of a color to match surface finish.

2.7 UNIONS

A. Contractor shall provide and install unions for piping connections on each side of all equipment, control valves and at other points where shown on the Drawings. Unions shall be flanged or 150 pound malleable iron with ground bronze seat. Dielectric unions shall isolate dissimilar metals (e.g., copper and ferrous piping) and shall be equal or equivalent to WATTS Series 3000. All valves with threaded connections, regardless of size, shall have as a minimum one union near to one size of the valve.

2.8 PRESSURE GAUGE AND GAUGE/SWITCH

A. Pressure gauge shall be Bourdon tube type, liquid-filled with rust and mildew inhibitor, with 4-1/2 inch white dial face, 1% or better accuracy, a 270 degree arc, and a 1000 psi minimum operating limit. Gauge shall be manufactured by Weiss, Weksler, Trerice, or approved equivalent.

B. The gauge range, in psig, shall be appropriate for the service intended. If the range is not shown on the drawings and the Contractor has any doubts, he shall request in writing the gauge range to use before ordering the gauge.

2.9 PRESSURE/TEMPERATURE TEST PORTS (PETE'S PLUGS)

A. General
   1. Each test port body shall be made of solid brass with 1/2" male pipe threads and a brass cap with a brass chain or a plastic tab cap retainer. Valve shall be the dual seal type with two core inserts. Test ports in pipes to be insulated shall be of extended length or have extension fittings.

B. Accessories
   1. Contractor shall provide to Owner a test port test kit consisting of the following:
      a. (2) pressure gauges with 2-1/2" dial faces and ranges from 0 to 200 psi,
      b. (2) gauge adapters,
      c. (2) thermometers each with a 2" dial face, one with a range of 25 to 125 degrees F, and one with a range of 0 to 220 degrees F, and
      d. (1) carrying case.

2.10 IDENTIFICATION AND DETECTION

A. Above Ground
   1. General - Pipes to be identified shall include domestic cold, hot water supply and return, and HVAC heating water. Indicate flow direction at each marker.
   2. Pipes shall be identified by marker bands that conform to ANSI A13.1-1981 requirements as

to color of background and characters, and to character size and marker length as shown below:

Fits Pipe O.D., in.	3/4" to 1"	1-1/8" to 2-3/8"	2-1/2" to 3-1/4"	3-3/8" to 4-1/2"	4-5/8" to 7-7/8"	8" to 10"
Letter Height	½"	¾"	1-1/4"	1-1/4"	1-1/4"	2-1/2"
Length of Color Field, in.	8"	8"	12"	12"	12"	24"

*O.D. includes insulation

a. Markers shall have arrows indicating direction of flow. Markers shall have integral ultraviolet inhibitors.
b. Pipe O.D. Less Than 6 Inches
c. Markers shall be one-piece wrap-around snap-on type of the correct size to grip the pipe (or insulation) firmly enough to prevent slippage, even when installed on a vertical pipe. Product shall be Seton "Setmark" type SNA, Bradysnap-on B-915, or approved equal.
d. Pipe O.D. 6 Inches or More
e. Markers shall be preformed to fit the pipe size, and they shall be secured by stainless steel spring fasteners. Marker and spring fasteners shall be of correct size to grip pipe firmly without slippage even when installed on a vertical pipe, but not so tight as to cut through vapor barrier or service jacket. Product shall be Seton "Setmark" type STR or approved equal.
f. Installation
   (1) Markers shall be installed not more than 20 feet apart, on both sides of a wall where a pipe penetrates (unless underground), at least once in every room, and at every tee connection other than direct equipment connections.

PART 3 - EXECUTION

3.1 FABRICATION AND INSTALLATION OF PIPING

A. General
1. All piping systems shall be kept clean during all phases of the work. Once fabrication has started on any length of pipe, the open ends of piping shall be kept plugged or capped when erection is not in progress to prevent the entry of dirt and other foreign material. The ends of spare lines shall be left capped or blind flanged when erection has been completed.
2. Reports for operating tests, as described herein, shall be prepared and issued in conformance with the requirements of Section 22 01 00. Similar reports shall additionally be prepared and issued for procedures of cleaning, flushing, chemical treatment, and disinfection, on any system including, but not limited to, domestic water lines, gas lines, and circulating water systems.
3. Piping systems shall be fabricated and installed in accordance with ANSI B31.1. The sizes, locations and slopes shall be as shown on the Drawings or as required by this Specification.
4. All piping systems that are not concealed, covered with insulation or otherwise exposed to view either inside or outside of the building shall be painted in accordance with the architectural painting specifications.

B. Threaded Systems

1. Burrs shall be removed from mating threads in threaded piping before assembly. Pipe shall be reamed to the nominal inside diameter after cutting. Inner surfaces of all pipes, valves, and fittings shall be smooth, clean and free from metal chips, sand, debris and dirt when erected.
2. All joints in threaded piping systems shall be made with Teflon Tape or joint sealant of the non-toxic type. Tape or sealant shall be applied to male threads only.

C. Soldered Systems
1. In general, soldered piping systems shall conform to IAPMO Standard IS-3-89.
2. Copper tubing shall be accurately measured to reach all the way into each socket without being too long so as to cause strain on the system.
3. Copper tubing shall be cut square using a wheel cutter only.
4. After cutting, both inside and outside of copper tubing shall be thoroughly reamed to remove burrs using a cone type deburring tool so that interior bore of piping is completely smooth without ridge.
5. The outside of copper tubing and the inside of each socket shall be cleaned by lightly abrading with a sand cloth, abrasive pads, or properly sized fitting brush.
6. Oxides shall be removed from the cleaned surfaces by applying a thin, even coating of flux that is compatible with the solder.
7. Fitting shall be preassembled and excess flux shall be removed.
8. Heat shall be applied to the fitting and precautions shall be taken to protect adjacent combustible materials from scorching or ignition. A protective device such as Flame-Gard by Atlanta Special Products or equivalent shall be employed where needed. A flame shall not be directed into the fitting socket.
9. When fitting is hot enough, solder shall be applied beginning slightly off-center at the bottom of the joint and then across the bottom and up to the top center. Then returning to the beginning, solder shall be applied overlapping the starting point and up the uncompleted side to the top, overlapping again.
10. Joint shall be allowed to cool naturally. Shock cooling by immersion in water or otherwise in not permitted.

D. Mechanical Joint Systems in Metallic Pipe
1. Pipe shall be prepared in accordance with manufacturers written instructions. Cutting and/or grooving tools shall be used as provided by the manufacturer of the fittings.
2. Pipe shall be sufficiently free of indentations, projections, grooves, weld seams, or roll marks on the exterior over the entire gasket seating area to ensure a leak-tight seal.
3. Gaskets shall be checked to verify that they are suited for the intended service.
4. Lubrication shall always be applied to the gasket exterior including the lips and/or pipe ends and housing interiors to prevent pinching of the gasket.
5. Fitting shall be applied without pinching, twisting, or otherwise deforming the gasket, and the retaining bolts shall be tightened down to manufacturer's recommended torques.
6. Contractor shall support and anchor mechanical joint piping systems in accordance with manufacturer's instructions.

3.2 VALVES

A. Valves, accessories and equipment shall be installed as shown on the Drawings. Install valves with stems upright or horizontal, not inverted.

B. Locations of valves as shown on Drawings are approximate. Each valve shall be installed so that adjacent piping or equipment will not interfere with:
1. access to and operation of the valve operating mechanism, or
2. access to and use of auxiliary devices such as pressure and/or temperature ports.

C. Valves shall receive identification tags.

3.3 WATER HAMMER ARRESTORS

A. Install in compliance with Standard PDI-WH 201.

B. Provide water hammer arrestors as shown on the drawings and where necessary to stop water hammering of domestic water lines from fast closing valves.

C. Provide isolation ball valve at each water hammer arrestor.

3.4 GAUGES

A. Unless shown otherwise, gauges shall be installed complete with 1/4" ball type isolation valve (as required) and 1/4" NPT brass tubing.

3.5 ACCESSIBILITY

A. Contractor shall provide and install access panels where required by Codes or for easy access to any above floor service such as valves which may normally require maintenance. Access panel shall be submitted to Architect for approval, but in general, the panel shall be square, either stainless steel, chrome-plated bronze, or prime coated as preferred by Architect, large enough to permit service of the device, either flush or face-of-wall mounting as preferred by Architect, with anchoring method appropriate for the wall into which it is to be installed, and secured with vandal-proof screws. Product shall be Jay R. Smith 4730 or 4735, Karp Type DSC, or approved equivalent.

3.6 TESTING AND ADJUSTING

A. General

1. No plumbing or drainage system or building sewer shall be covered or put into use until it has been tested, inspected, and accepted as prescribed by Code or herein.
2. Administrative Authority
   a. The Contractor doing the work is responsible for determining who the Administrative Authority is for his work and for obtaining permits and for arranging required tests and inspections. Before requesting observation of a test by anyone, that the system will pass the prescribed test(s). Notify the General Contractor and the Architect that the preliminary tests have been performed, that system passed the tests, and that Contractor is ready to notify Administrative Authority. Architect shall have the authority to require that the test(s) be replicated in the presence of himself and/or the Engineer. Contractor shall receive Architect's approval before notifying Administrative Authority of readiness for testing.
   b. Notify Administrative Authority that work is ready for inspection. Contractor shall notify Architect as to date and time of test(s) so that he and/or Engineer may be present if needed.
   c. The above process shall be continued until the system is approved by the Administrative Authority.
3. Costs
   a. Any equipment, material, and/or labor necessary for tests or inspections shall be furnished by the Contractor as part of this Contract at no cost to anyone else but the Contractor.
   b. Any required repairs, corrections, or modifications, including equipment, materials, and/or labor, shall be provided or performed by the Contractor at no cost to anyone else but the Contractor.
4. Prepare and provide reports per "OPERATING TESTS" in Specifications Section 15010.

B. DOMESTIC WATER

1. Leak Testing
   a. Test domestic water system, including cold water and hot water supply and return piping for leaks as follows:
      (1) Cap all piping at final connections to fixtures and equipment.
      (2) Test hydrostatically at a pressure of 150 psig maintained for 6 hours.
      (3) If, after test duration period, a drop of more than 3 psig is observed, make required corrections to defective portions of the system and repeat test procedure until system is proved tight.
      (4) Remove caps from piping and make final connections to fixtures and equipment.
      (5) Visually inspect connections to fixtures and equipment for a period of 12 hours when entire system is put into operation at line pressure and make any necessary repairs.
2. Cleaning and Disinfecting
   a. Thoroughly flush cold and hot domestic water piping with water to remove all foreign particles.
   b. Sterilize the lines by filling the system with a solution of chlorine containing 50 ppm of chlorine. Solution shall be made from pure calcium hypochlorite with no trace elements or compounds. The solution shall stay in the line for a minimum period of 24 hours during which time each valve shall be opened and closed several times in order that all parts of the valve shall be in contact with the solution.
   c. After the sterilization period, drain, thoroughly flush the system with clean potable water, and perform potability tests as described.
3. Potability Testing
   a. After disinfecting and flushing the system, perform, or have performed, tests as described below.
      (1) On-Site Chemical Testing
         (a) Obtain chlorine test kits, each of which shall consist of a container for the sample, a color-forming reagent, and a color comparison chart. Kit shall be Hach Colormetric, Chemetrics 'CHEMets', or equivalent.
         (b) At each water outlet, including but not necessarily limited to, sinks, lavatories, drinking fountains, water coolers, hose bibbs, showers, and hydrants, where a person could drink from or be exposed to domestic water, perform an on-site chlorine test using the test apparatus described above. At each test location, chlorine level shall indicate to be 0.2 ppm or less or, alternatively, no greater than the incoming chlorine concentration from the water utility.
      (2) Laboratory Biological Tests
         (a) Obtain a 'WATER BACTERIOLOGY' testing kit from the State Health Department Laboratory. Water testing kit consists of a plastic sample bag, a sodium thiosulfate tablet inside the bag, and a set of printed instructions.
         (b) Follow the printed instructions which generally tell where and how to take the sample, how to treat the sample, and what to do with the sample. Send or take the sample per instructions to the nearest State approved laboratory. NOTE: Sample must be received by the laboratory within 30 hours of the time the sample was taken or the results will be unsuitable for analysis. In such an event, repeat the

procedure until a suitable sample is received by the laboratory.

4. Tags
   a. Remove 'nonpotable' tags on plumbing fixtures (that were installed earlier in the project) but only after water system is subjected to disinfection procedures and passes tests described above.
5. Reports
   a. Prepare and provide written reports and/or test results at each stage of testing as described above.

C. HOT WATER RETURN
1. Balance domestic hot water return system so that hot water is readily available at all fixtures and equipment and that flow is assured and demonstrable at the end of each circulating line.

B. HOT WATER SUPPLY TEMPERATURE
1. The hot water supply temperature valves shall be properly set up and adjusted to the required temperatures in accordance with the manufacturer’s instructions by a manufacturer trained technician.

END OF SECTION

SECTION 22 05 29

HANGERS AND SUPPORTS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Pipe hangers and supports.
2. Hanger rods.
3. Inserts.
4. Flashing.
5. Equipment curbs.
6. Sleeves.
7. Mechanical sleeve seals.
8. Formed steel channel.
9. Firestopping relating to Plumbing work.
10. Firestopping accessories.
11. Equipment bases and supports.

1.2 REFERENCES

A. American Society of Mechanical Engineers:
1. ASME B31.1 - Power Piping.
2. ASME B31.5 - Refrigeration Piping.
3. ASME B31.9 - Building Services Piping.

B. ASTM International:
1. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM E119 - Method for Fire Tests of Building Construction and Materials.
3. ASTM E814 - Test Method of Fire Tests of Through Penetration Firestops.
4. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.
5. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.

C. American Welding Society:
1. AWS D1.1 - Structural Welding Code - Steel.

D. FM Global:
1. FM - Approval Guide, A Guide to Equipment, Materials & Services Approved By Factory Mutual Research For Property Conservation.

E. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
2. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.
3. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

F. Underwriters Laboratories Inc.:

1. UL 263 - Fire Tests of Building Construction and Materials.
2. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
3. UL 1479 - Fire Tests of Through-Penetration Firestops.
4. UL 2079 - Tests for Fire Resistance of Building Joint Systems.
5. UL - Fire Resistance Directory.

G. Intertek Testing Services (Warnock Hersey Listed):
1. WH - Certification Listings.

1.3 DEFINITIONS

A. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction. Install in strict accordance with manufacturers listing instructions.

1.4 SUBMITTALS

A. Shop Drawings: Indicate system layout with location including critical dimensions, sizes, and pipe hanger and support locations and detail of trapeze hangers.

B. Product Data:
1. Hangers and Supports: Submit manufacturers catalog data including load capacity.
2. Firestopping: Submit data on product characteristics, performance and limitation criteria.

C. Firestopping Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.

D. Design Data: Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers. Indicate calculations used to determine load carrying capacity of trapeze, multiple pipe, and riser support hangers.

E. Manufacturer's Installation Instructions:
1. Hangers and Supports: Submit special procedures and assembly of components.
2. Firestopping: Submit preparation and installation instructions.

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

G. Engineering Judgments: For conditions not covered by UL or WH listed designs, submit judgments by licensed professional engineer suitable for presentation to authority having jurisdiction for acceptance as meeting code fire protection requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

B. Protect from weather and construction traffic, dirt, water, chemical, and damage, by storing in original packaging.

1.6 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Manufacturers:
1. Carpenter & Paterson Inc.
2. Creative Systems Inc.
3. Flex-Weld, Inc.
4. Globe Pipe Hanger Products Inc.
5. Michigan Hanger Co.
6. Superior Valve Co.
7. Fee and Mason.
8. B-Line.
9. Grinnell
10. Portable Pipe Hanger

B. Piping:
1. Conform to ASME B31.9.
2. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron or Carbon steel, adjustable swivel, split ring.
3. Hangers for Hot Pipe Sizes 2 to 4 inches: Carbon steel, adjustable, clevis.
4. Hangers for Hot Pipe Sizes 6 inches and Larger: Adjustable steel yoke, cast iron roll, double hanger.
5. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
6. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 inches and Larger: Steel channels with welded spacers and hanger rods, cast iron roll.
7. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hooks.
8. Wall Support for Pipe Sizes 4 inches and Larger: Welded steel bracket and wrought steel clamp.
9. Wall Support for Hot Pipe Sizes 6 inches and Larger: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
10. Vertical Support: Steel riser clamp.
11. Roof Support for Pipe Sizes 2 inches and Smaller: Polypropylene (UV Stabilized) Pad type support with adjustable height hot dipped galvanized formed steel channel support. Portable Pipe Hanger SS8-C or similar. Secure pad to roof with mastic compatible with roofing system (verify with roof material supplier). Clamp piping to channel.
12. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
13. Copper Pipe Support: Copper-plated, carbon steel ring.

2.2 ACCESSORIES

A. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded.

B. Insulated piping: Reference insulation specifications.

2.3 INSERTS

A. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.4 FLASHING

A. Metal Flashing: 22 gage thick galvanized steel.

B. Metal Counterflashing: 22 gage thick galvanized steel.

C. Lead Flashing:
1. Waterproofing: 5 lb./sq. ft sheet lead.
2. Soundproofing: 1 lb./sq. ft sheet lead.

D. Flexible Flashing: 47 mil thick sheet butyl; compatible with roofing.

E. Caps: Steel, 22 gage minimum; 16 gage at fire resistant elements.

2.5 SLEEVES

A. Sleeves for Pipes Through Non-fire Rated Floors: 18 gage thick galvanized steel.

B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage thick galvanized steel.

C. Sleeves for Round Ductwork: Galvanized steel.

D. Sleeves for Rectangular Ductwork: Galvanized steel.

E. Sealant: Silicone; refer to Section 07 90 00.

2.6 MECHANICAL SLEEVE SEALS

A. Manufacturers:
1. Thunderline Link-Seal, Inc.
2. NMP Corporation.

B. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.7 FORMED STEEL CHANNEL

A. Manufacturers:
1. Allied Tube & Conduit Corp.
2. B-Line Systems
3. Midland Ross Corporation, Electrical Products Division.
4. Unistrut Corp.

5. Powerstrut
6. Kindorf

B. Product Description: 12 gage thick steel, pre-galvanized prior to roll forming, G90 zinc weight conforming to ASTM A653. With holes 1-1/2 inches on center.

C. All channels, bolts, nuts, washers, rods and other fittings used on fabrications exterior to the building shall be hot-dipped galvanized finish – ASTM A123 or A153.

2.8 FIRESTOPPING

A. Manufacturers:
1. Dow Corning Corp.
2. Fire Trak Corp.
3. Hilti Corp.
4. International Protective Coating Corp.
5. 3M fire Protection Products.
6. Specified Technology, Inc.

B. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.

1. Silicone Firestopping Elastomeric Firestopping: Single component silicone elastomeric compound and compatible silicone sealant.
2. Foam Firestopping Compounds: Single component foam compound.
3. Formulated Firestopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non-asbestos fibers.
4. Fiber Stuffing and Sealant Firestopping: Composite of mineral or ceramic fiber stuffing insulation with silicone elastomer for smoke stopping.
5. Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
6. Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.
7. Firestop Pillows: Formed mineral fiber pillows.

2.9 FIRESTOPPING ACCESSORIES

A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.

B. Dam Material: Permanent:
1. Mineral fiberboard.
2. Mineral fiber matting.
3. Sheet metal.
4. Plywood or particle board.
5. Alumina silicate fire board.

C. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.

D. General:

1. Furnish UL listed products or products tested by independent testing laboratory.
2. Select products with rating not less than rating of wall or floor being penetrated.

E. Non-Rated Surfaces:
1. Stamped steel, chrome plated, hinged, split ring escutcheons or floor plates or ceiling plates for covering openings in occupied areas where piping is exposed.
2. For exterior wall openings below grade, furnish mechanical sealing device to continuously fill annular space between piping and cored opening or water-stop type wall sleeve.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify openings are ready to receive sleeves.

B. Verify openings are ready to receive firestopping.

3.2 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.

B. Remove incompatible materials affecting bond.

C. Install backing and damming materials to arrest liquid material leakage.

D. Obtain permission from Engineer before using powder-actuated anchors.

E. Do not drill or cut structural members.

3.3 INSTALLATION - INSERTS

A. Install inserts for placement in concrete forms.

B. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches and larger.

D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

E. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

3.4 INSTALLATION - PIPE HANGERS AND SUPPORTS

A. Install in accordance with ASME B31.1, ASME B31.5, and ASME B31.9.

B. Support horizontal piping as scheduled.

C. Install hangers with minimum 1/2 inch space between finished covering and adjacent work.

D. Place hangers within 12 inches of each horizontal elbow.

E. Use hangers with 1-1/2 inch minimum vertical adjustment.

F. Support vertical piping at every floor.

G. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.

H. Support riser piping independently of connected horizontal piping.

I. Provide copper plated hangers and supports for copper piping.

J. Design hangers for pipe movement without disengagement of supported pipe.

K. Prime coat exposed steel hangers and supports. Refer to Section 09 90 00. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

L. Provide clearance in hangers and from structure and other equipment for installation of insulation. Refer to Section 22 07 00.

M. Cut off hanger rods to within 1 inch of support. Finish exposed rods with acorn nut.

N. Coat cut ends of galvanized channel and hardware used exterior of the building with zinc-rich paint such as ColdGalv or similar.

O. Roof piping support: Provide polycarbonate pillow-block type such as Miro Products Model 1.5.

3.5 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

A. Provide housekeeping pads of concrete, minimum 3-1/2 inches thick and extending 6 inches beyond supported equipment. Refer to Section 03 30 00.

B. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.

C. Construct supports of steel members or formed steel channel. Brace and fasten with flanges bolted to structure.

D. Provide rigid anchors for pipes after vibration isolation components are installed.

3.6 INSTALLATION - FLASHING

A. Provide flexible flashing and metal counter flashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.

B. Provide acoustical lead flashing around ducts and pipes penetrating equipment rooms for sound control.

C. Provide curbs for roof installations 14 inches minimum high above roofing surface. Flash and counter-flash with sheet metal; seal watertight. Attach counter flashing to equipment and lap base flashing on roof curbs. Flatten and solder joints.

D. Adjust storm collars tight to pipe with bolts; caulk around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.

E. All roof penetrations shall be provided in complete accordance with roofing manufacturer's instructions and approval.

3.7 INSTALLATION - SLEEVES

A. Exterior watertight entries: Seal with mechanical sleeve seals.

B. Set sleeves in position in forms. Provide reinforcing around sleeves.

C. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

D. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.

E. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with firestopping insulation and caulk. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

F. Install chrome plated steel or stainless steel escutcheons at finished surfaces.

3.8 INSTALLATION - FIRESTOPPING

A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, and other items, requiring firestopping.

B. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.

C. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating in accordance with the product listing.

D. Non-Rated Surfaces:
1. Seal opening through non-fire rated wall, partition, floor, ceiling, and roof opening as follows:
   a. Install sleeve through opening and extending beyond minimum of 1 inch (25 mm) on both sides of building element.
   b. Size sleeve allowing minimum of 1 inch (25 mm) void between sleeve and building element.
   c. Install type of firestopping material recommended by manufacturer.
2. Install escutcheons where pipe, penetrates non-fire rated surfaces in occupied spaces. Occupied spaces include rooms with finished ceilings and where penetration occurs below finished ceiling.

3. Exterior wall openings below grade: Assemble rubber links of mechanical sealing device to size of piping and tighten in place, in accordance with manufacturer's instructions.
4. Interior partitions: Seal pipe penetrations at clean rooms, laboratories, medical spaces, computer rooms, telecommunication rooms, and data equipment rooms. Apply sealant to both sides of penetration to completely fill annular space between sleeve and pipe.

3.9 FIELD QUALITY CONTROL

A. Inspect installed firestopping for compliance with specifications and submitted schedule.

3.10 CLEANING

A. Clean adjacent surfaces of firestopping materials.

3.11 PROTECTION OF FINISHED WORK

A. Protect adjacent surfaces from damage by material installation.

3.12 SCHEDULES

A. Copper and Steel Pipe Hanger Spacing:

PIPE SIZE Inches (mm)	COPPER TUBING MAXIMUM HANGER SPACING Feet (m)	STEEL PIPE MAXIMUM HANGER SPACING Feet (m)	COPPER TUBING HANGER ROD DIAMETER Inches (mm)	STEEL PIPE HANGER ROD DIAMETER Inches (mm)
1/2 (12)	5 (1.5)	7 (2.1)	3/8 (9)	3/8 (9)
3/4 (20)	5 (1.5)	7 (2.1)	3/8 (9)	3/8 (9)
1 (25)	6 (1.8)	7 (2.1)	3/8 (9)	3/8 (9)
1-1/4 (32)	7 (2.1)	7 (2.1)	3/8 (9)	3/8 (9)
1-1/2 (38)	8 (2.4)	9 (2.7)	3/8 (9)	3/8 (9)
2 (50)	8 (2.4)	10 (3)	3/8 (9)	3/8 (9)
2-1/2 (65) (Note 2)	9 (2.7)	11 (3.4)	1/2 (13)	1/2 (13)
3 (75)	10 (3)	12 (3.7)	1/2 (13)	1/2 (13)
4 (100)	12 (3.7)	14 (4.3)	1/2 (13)	5/8 (15)

B. Refer to manufacturer’s recommendations for grooved end piping systems.

C. Refer to manufacturer’s recommendations for PVC, CPVC and other piping materials.

D. 20 feet maximum spacing, minimum of one hanger for each pipe section close to joint behind bell. Provide hanger at each change of direction and each branch connection. For pipe sizes 6 inches and smaller, subjected to loadings other than weight of pipe and contents, limit span to maximum spacing for water service steel pipe.

END OF SECTION

SECTION 22 07 00

PLUMBING INSULATION

PART 1 – GENERAL

1.1 SCOPE

A. Furnish all labor and materials necessary for the complete installation of thermal insulation on all hot and cold surfaces which require insulation for heat or cold conservation, comfort and safety of occupants, efficiency or ease or operation, or to prevent condensation or dripping. The insulation shall be complete and effective throughout the building.

B. Section Includes:
1. Piping system insulation.
2. Pipe insulation jackets.
3. Insulation accessories including vapor retarders and accessories.

C. All work shall be performed in a neat and professional manner by a Contractor or Subcontractor regularly engaged in the insulation field. The Mechanical Contractor shall be responsible for the bidding and execution of this work.

D. Any equipment or devices mentioned specifically in this section or any equipment or devices installed by the Mechanical Contractor that can have or cause temperatures low enough to cause condensation shall be adequately insulated and vapor sealed. If equipment, devices, or required insulation product is not specifically mentioned in this section or shown on drawings, the Contractor is required to request and obtain written instructions from the Engineer. If condensation should occur due to inadequate or missing insulation and/or vapor sealing, such damage, including damage to other affected property or building elements, shall be repaired by Contractor at no cost to the Owner.

1.2 GENERAL REQUIREMENTS

A. All insulation inside the building shall have composite (insulation, jacket or facing, and adhesive or cement used to adhere the jacket to the insulation) flame-spread rating of 25 or less and smoke-developed rating of 50 or less as tested under procedure ASTM E-84 and NFPA 255.
1. Insulation with a less stringent flame and smoke rating may be used only with the written permission of the Engineer.
2. Insulation products that meet the 25/50 rating requirement but that melt and drip flammable products, such as closed cell polyethylene products, are not acceptable.

B. Accessories such as adhesive, mastics, cements, and cloth for fittings shall be permanently fire and smoke resistant. Chemicals used for treating paper in jacket laminates shall be unaffected by water or humidity.

C. All adhesives, sealers, vapor barrier coatings, etc., shall be compatible with materials to which they are applied and shall not corrode, soften, or attack such materials in either the wet or dry state. Unless otherwise approved, all adhesives, sealers, coatings, mastics, etc., shall be water based.

D. Any insulation product found to be damaged or has become wet, whether installed or stored, shall be immediately removed and replaced with new product.

E. Thermal insulation shall be applied where needed, including but not limited to the following systems, as described herein:
1. Domestic Cold Water, Hot Water Supply and Return,
2. Condensate Drainage
3. Horizontal roof drain.

PART 2 - PRODUCTS

2.1 PIPING INSULATION

A. General
1. Insulation shall be one piece molded fiberglass with a factory applied all service vapor barrier jacket composed of kraft-reinforced foil. Insulation, with or without jacket, shall meet the requirements of ASTM C547, Class 1 and 2. Composite shall be rated by the manufacturer for use on hot or cold surfaces, either exposed or concealed, from -20 to +450 degrees F. Jacket shall conform to ASTM E96 with a permeability not exceeding 0.02 perms. Insulation shrinkage shall be less than 0.5% per ASTM C356. The insulation shall be sized by the manufacturer and correctly provided and installed by the Contractor to fit both the nominal pipe size and also the pipe material, i.e. ferrous versus non-ferrous. Thermal conductivity shall be no greater than 0.27 BTU in./hr/sq. ft./deg. F at a mean temperature of 75 degrees F. Jacket sealing system shall be a self-sealing lap type with pressure-sensitive adhesive. Product shall be Certainteed Snap*Form, Knauf Pipe Insulation, Manville Micro-Lok, Owens/Corning SSL-II or approved equivalent.
2. Fittings, including but not limited to, short and long radius ells, tees, reducers, traps, valves, (except HVAC control valve) shall be insulated with factory made, one-piece, pre-molded high impact PVC covers with pre-cut fiberglass insulation inserts. Acceptable products are Snap*Form by Certainteed, Knauf Fitting Cover System, Zeston 2000 by Manville, or approved equivalent.
3. Piping Exposed to Weather and Piping Exposed Inside of the Building: Provide jacket of 0.016 thick aluminum with longitudinal z-joint similar to J-M "metal-lok". Secure with holding band. On pipe sizes 6 inches and above, aluminum jacket may be secured in place with screws 4 inches on center. Apply aluminum jacket continuously at all fittings including ells, tees, reducers, etc..

B. Thickness
1. Piping Indoors

Service	Pipe Size	Min. Thickness
Hot	1-1/4" and smaller	1-1/2 inch

2. Piping exposed to ambient and conveying water shall have minimum 2-inch thick insulation.

C. Above Slab Floor/Hub Drain Bodies and Traps Receiving Cold Condensate and Horizontal Roof Drain and Overflow Drain Piping
1. Material and Methods
a) Plumbing traps receiving cold condensate (such as floor drains serving AHUs, ice machine drains) shall be insulated and vapor sealed. Horizontal piping from such traps shall be insulated for a distance of ten feet downstream from the trap or to wherever to drain piping connects to another drain branch, whichever is least.
b) Bottom of roof and overflow drain receptors, connector elbow and horizontal drain piping shall be insulated and vapor sealed.

c) Insulation shall be 1-1/2 inches thick fiberglass duct wrap with density of 0.75 lb/cu. ft. and a K factor of 0.35. Insulation shall be similar and equal to CertainTeed standard duct insulation with Foil-Skrim-Kraft composite vapor barrier.

2. Drain Insulation Alternative Materials
   a) At Contractor's option, 1/2-inch thick fiberglass pipe insulation and fitting insulation with covers similar to that specified for general piping with vapor sealing may be substituted.

D. Closed Cell Insulation
1. For cold condensate copper drain lines, a flexible, closed-cell, elastomeric insulation shall be used according to the following schedule:

Service	Pipe Size	Min. Thickness
Cold Condensate	all sizes	1/2 inch

2. Insulation shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less as tested by ASTM E84-84A. Insulation shall be in a tubing form, both factory fabricated and also provided and installed correctly by the Contractor for the size and material of the pipe to which it is to be applied. Such insulation in a tape form is not acceptable. Product shall be ARMAFLEX by Armstrong or approved equivalent.
3. Any cellular insulation product exposed to the exterior of the building shall have 2 coats of Armaflex white protective paint coating.

2.2 EQUIPMENT

A. All equipment shall be factory insulated where specified. All equipment installed in a duct downstream of a cooling coil, for example, a hot water heating coil, a duct furnace, etc., shall have insulation equal to external duct insulation applied to prevent condensation. Alternatively, a closed cell elastomeric insulation in sheet form such as ARMAFLEX may be used in strict conformance with manufacturer's written instructions and these specifications.

PART 3 - EXECUTION

3.1 PIPING INSULATION INSTALLATION

A. General
1. All insulation shall be continuous through wall and ceiling openings and sleeves. Insulation on all cold surfaces, where vapor barrier jackets are used must be applied with a continuous unbroken vapor seal. Hangers, supports, anchor, etc., that are secured directly to cold surfaces must be adequately insulated and vapor sealed to prevent condensation. Where insulation is discontinued, special care shall be taken to taper the insulation to the pipe to allow for vapor barrier to completely seal off end of the insulation.
2. Insulation shall be applied after the surfaces have been thoroughly cleaned and dry and all piping has been tested and proven tight.
3. Circumferential self-sealing strips shall be applied to all butt joints to form a positive closure.
4. On all premolded fiberglass insulation with self-sealing adhesive strips, Contractor shall apply outward clenching staples along the longitudinal strip, on 12 inch centers. Contractor shall additionally apply a mastic along the entire longitudinal strip, taking care to completely cover and seal the staples, and along the circumferential strip at butt joints, completely covering the adhesive strip and at

least 3/4 inch on each side of the strip. Mastic shall be Hardcast "Flex-Grip", Rectorseal "Air Lock", or approved equivalent.

B. Supports

1. Metal shields shall be applied between hangers or supports and all types of pipe insulation. Shields shall be formed to fit the insulation and shall extend minimum up to the center line of the pipe. A full coat of insulating sealer shall be applied to the surface of the insulation in contact with the metal shield. The metal shields shall conform to the following chart:

Pipe Size	Metal Ga.	Shield Length
½" to 3"	20 ga.	12"
4" and up	16 ga.	16"

2. On pipes sizes 1-1/2 inches and larger, Contractor shall provide and install at each support, a high density insulation insert to carry the weight of the pipe. Insert shall be premolded to fit the pipe size, shall cover the bottom half of the pipe, and shall be one inch longer at each end than the sheetmetal shield. For pipes that are not susceptible to condensation such as heating water pipes, domestic hot water pipes, etc., the high density insulation insert material shall be calcium silicate, perlite, urethane, or cellular glass. On pipes that are susceptible to condensation such as chilled water pipes, domestic cold water pipes, etc., the high density insulation material shall be urethane or cellular glass.

C. Fittings

1. On pipes carrying warm or hot liquids, the fitting covers may be secured with tacks or snaps with the butt joints taped at the pipe insulation. On pipes carrying cold liquids, the fitting covers shall receive a vapor barrier sealant similar to that in "Pipes" above.

D. Valves

1. Valves installed in lines carrying cold liquids, i.e. chilled HVAC water, chilled drinking water, or any other liquid of sufficiently low temperature as to cause condensation on the valve body surface, shall have the valve body insulated and vapor sealed up to the bottom of the operating device (handle, wheel, etc.).
2. Valves installed in lines carrying hot liquids, e.g. heating water, domestic hot water, etc., shall be similarly insulated but not vapor sealed.
3. All valves provided and installed by others that are installed in pipe to receive insulation are to have provisions to accommodate the insulation. If the Insulation Contractor encounters a valve that does not have adequate provision to accommodate the insulation without reduction in thickness and without compressing the insulation, then it is the responsibility of the Insulation Contractor not to try to insulate the valve body and to inform the General Contractor immediately so that corrective action may be initiated.
4. Exposed stop valves for plumbing fixtures are excluded.

E. Domestic Cold and Hot Water Piping

1. Domestic cold and hot water mains and runouts shall be insulated as outlined above. Water lines inside interior partitions to single fixtures are required to be insulated.

F. Cold Condensate Drain Lines

1. Insulate and continuously vapor seal each cold condensate drain and drain line from the point where it attaches to a fan-coil unit, air handler, or other device until it discharges into a floor drain, hub drain, or other device. The insulation and vapor seal shall run continuously around any P-trap.

G. Elastomeric Insulation
1. Fittings including, but not limited to, ells, tees, caps, reducers, and valves, shall be adequately insulated and vapor sealed (where required) by using miter-cut tubing or the same insulation in a sheet form.
2. In all cases, all butt joints and seams are to be completely sealed with a contact adhesive manufactured and provided by the insulation manufacturer, such as Armstrong 520 Adhesive.
3. Insulation installed outdoors or exposed to sunlight shall have applied two coats of weather-resistant protective finish, Armstrong Armaflex Finish or approved equivalent. The protective finish shall cover 100% of the exposed insulation.

END OF SECTION

SECTION 22 10 15

IN-PLACE PRESSURE PIPE SYSTEM REHABILITATION

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes the use of in-place epoxy pipe cleaning and lining methodology for corrosion control applications in building rigid piping systems. Requirements in this specification apply to the Nu Flow “Barrier Coatings” method using conditioned compressed air, an abrading agent and approved epoxy coatings. Specification covers equipment, operators, pipe cleaning and surface preparation, application procedures, test procedures, production quality assurance and documentation.

1.2 References. The following references are government and industry standards pertinent to the Nu Flow Barrier Coatings pipe rehabilitation method:

A. ANSI/AWWA C210-84

1. Liquid Epoxy Coating Systems for Interior and Exterior of Steel Water Pipelines - SSPC SP10

B. Surface Preparation Spec-No. 10; Near White Blast Cleaning - ANSI/NSF 14

C. Plastics Piping System Components and Related Materials - ANSI/NSF 61 Drinking Water System Components "Health Effects"

D. OSHA - Standard Material Safety Data Sheet

E. EXECUTIVE ORDER G-565 - California Air Resources Board Abrasive Certification List

F. MIL-C- Epoxy Coating for Interior Pipe Surface-Shipboard CHT Piping Systems

1.3 Applications.

A. The Nu Flow process may be used on the following piping systems:

1. Copper tubing

1.4 QUALITY ASSURANCE

A. To ensure the safe, effective rehabilitation of pipe systems, the following quality assurance steps are performed:

1. Qualifications of Contractor
2. Contractor shall be licensed to perform work in the United States and the State in which work is to be performed, and have a minimum of five (5) years successful on-site experience in performing in-place epoxy pipe restoration work on domestic water piping systems in the United States in applications involving restoration to ½” inch diameter hot and cold water piping. The qualified contractor shall also have legitimate and documented access to, or possession of, the NSF Standard 61Certified epoxy lining product.

B. Air-Sand Technician Qualifications

1. All epoxy pipe lining technicians shall be properly trained in the following skills pertinent to the Nu Flow barrier coatings pipe rehabilitation process:
2. Proper staging and connection of air generation, filtration, pipe cleaning, dust collection and air monitoring equipment.

3. Proper distribution, layout and connection of air supply, pipe cleaning, epoxy lining and bypass piping hoses.
4. Assembly, disassembly and installation of pre-assembled interconnect piping sub-assemblies (“dummies”) between building piping and air supply hoses at fixture locations. Includes removal of existing angle stop valves at fixtures to install pipe cleaning and lining “dummies; return of same following epoxy lining. Also includes installation of hose and fittings assemblies required for 1) pipe cleaning and lining supply air intake, and 2) post-cleaning corrosion residue and epoxy discharge to dust collection and epoxy recovery system.

C. All of the above duties fall within the technical scope of the Nu Flow Barrier coatings process guidelines, and does not involve work which alters or modifies the existing piping layout at the property being rehabilitated. Other work involving installation of new pipe (i.e., to replace untreatable worn or clogged piping, etc.), or the re-routing or re-configuration of the existing piping system will be performed separately by qualified plumbers, as required.

D. Visual Inspection of Project Site.
1. Assess Proposed Work Environment:
2. Staging areas for equipment
3. Impact on neighboring facilities
4. Governmental permits
5. Noise
6. Accessibility to building and piping
7. Presence of Asbestos
8. Pedestrian and vehicular traffic

E. Air Pressure & Leak Test.
1. Following pipe cleaning, the section will be flushed with air to remove residual abrading material and dust/fines from the piping being treated, and pressure tested to confirm the absence of leaks to ensure the integrity of the system prior to epoxy coating.

PART 2 - PRODUCTS

2.1 Abrading Agent.
A. Idaho Emerald Creek Garnet abrasive grit is used to clean the pipe and to provide an anchor tooth of 50 to 75 micrometers (2 to 3 mils) during final surface preparation of the pipe. The sand is used in dry form and contains less than 5 percent fines which leaves minimal residue in the pipe. The sand contains no feldspar, iron, aluminum or other materials which might remain embedded in the surface or create galvanic interaction with the pipe. The abrading agent is not reused and will be disposed of by the contractor in accordance with State and local requirements and regulations.

2.2 Epoxy Coating.
A. A two-component epoxy system suitable for use with potable water piping systems shall be used to provide protection from corrosion to the interior of the piping systems. The coating system is not intended for pipe that will be mechanically bent or heated (i.e., soldered) after the coating has been applied. The coating system is a self-priming 100% solids epoxy barrier against all moisture, water, chemical permeation and harmful metal leaching. Available coatings shall meet ANSI/NSF 14 and ANSI/NSF 61 standards for use in potable water systems.

PART 3 – EXECUTION

3.1 PROCESS DESCRIPTION

A. Epoxy pipe lining is accomplished by initially drying the pipe with conditioned air and using in an airborne stream of specified abrading agent to remove accumulated corrosion buildup and residue from within the pipe interior wall. This cleaning procedure shall also establish the necessary anchor tooth profile in the pipe for optimal epoxy adhesion. Following inspection of the pipe to ensure that all grit and surface contaminants have been removed, a two-part all-solids epoxy coating is applied to the desired thickness. The coating is cured in-place and provides a hard and durable protective barrier in the piping, which is resistant to future corrosion activity and noted contaminants.

3.2 GENERAL SAFETY

A. Personnel Safety.

1. All personnel shall be properly trained in the Nu Flow Barrier Coatings method of pipe rehabilitation and read, understand and comply with the Nu Flow safety program.

B. Surface Preparation Safety.

1. The abrading agent shall be totally contained in the pipe, hoses and collection equipment.
2. All equipment and pipe shall be disposed of in accordance with the Nu Flow waste management plan.

C. Personal Protection.

1. Observe all safety precautions listed in the Material Safety Data Sheets for each material being used.
2. Approved hearing protection shall be used at all times in the vicinity of air generation equipment.
3. Two-way radio communication shall be maintained at all times between operators whenever air is being transported through the piping or hoses.

3.3 EQUIPMENT

A. Air Generation System.

1. Equipment must provide sufficient air volume and stream velocity to effectively clean the piping, establish a suitable anchor tooth profile within the pipe, and to properly line the pipe.

B. Filters.

1. Water / oil filters are used in the air generation system and are periodically inspected and serviced to ensure delivery of uncontaminated dry air. The maximum airborne particle size is 0.03 microns for oil and water.

C. Air Pressure.

1. An air pressure manifold is used to regulate and monitor the flow of air introduced through distribution hoses and the treated piping.

D. Abrading Agent Injector.

1. A mechanical device injects the abrading agent into the air stream at a measured rate to clean the pipe interior surface and prepare it for subsequent epoxy lining.

E. Dust Collector.

1. Filtration and dust collection equipment collect all spent abrading material and filters out remaining dust in the air stream. Dust collector efficiency is 99.5% using .5 micron filters.

3.4 PROCESS

A. Condition of Pipe.

1. When the piping systems physical condition is in doubt, Nu Flow may use its discretion to test for wall thickness using manual or electronic means to measure the average thickness and general condition of the pipe system. Nu Flow recommends that pipe measured or inspected as having less than 20-30 percent of original wall thickness be replaced.

B. Surface Preparation – Pipe Cleaning.

1. Prior to applying the epoxy coating, the surfaces to be coated shall be prepared by passing an airborne abrading agent through the pipe to clean and dry the substrate and provide an anchor tooth on the pipe interior wall. The prepared surface shall have a near white-metal blast appearance (conforms to SSPC SP10 Standards), and an anchor tooth surface profile of 50 to 75 micrometers (2 to 3 mils) which is measured at the pipe inlet and outlet with profile tape and a dial or probe micrometer.

2. Any piping sections or fittings which are not treatable due to 1) age and/or related excessive wear (i.e., leaking, thin-walled pipe and/or pipe threads), or 2) pipe which is fully or partially blocked with corrosion products and residue so as not to allow adequate air flow into the pipe for cleaning purposes, must be replaced with new galvanized steel or copper pipe to maintain the integrity of the overall building/property piping system. In instances where the corrosion properties in the pipe are favorable to warrant, Nu Flow will distribute a non-toxic cleaning agent through the designated piping section to facilitate the breakdown of the corrosion buildup, prior to continuing with air-sand restoration. Where pipe replacement may be required, Nu Flow will consult with the Owner(s) regarding such areas of concern before pipe restoration commences. In cases where, during the drying/cleaning procedure, untreatable pipe requiring replacement is discovered, Nu Flow will use its discretion in replacing the pipe section or fitting(s) in order to continue work. The removed pipe or fitting(s) will be retained and made available to the *Owner(s)* the following day for inspection and review. Nu Flow will always make a reasonable attempt to identify, in advance, piping areas where spot repair and/or replacement may be required. Such chargeable incidental pipe replacement work will be arranged and implemented per contract conditions and requirements.

C. Application of the Epoxy Coating.

1. Effective coating requires the pipe temperature to be raised and maintained at least 10 degrees (F) above dew point. The surface requires protection from finger marks, oils and other contaminants which may compromise the bonding efficacy of the epoxy coating. The air stream is visually inspected prior to pipe lining at the exhaust (exit) end of the piping section being treated to determine discharge temperatures and to assess the presence of moisture in the air supply. Given acceptable air temperature and moisture dynamics in the treatment environment, the epoxy coating shall be applied in pre-measured quantities throughout the designated pipe section using the heated conditioned air as the transport medium. Continuous air flow at regulated temperatures shall be maintained at all times before, during and following introduction of the epoxy lining into the piping to prevent moisture contamination of the coating. For pipe diameters exceeding 3”, a second coat of epoxy may be required following review of the pipe and restoration environment.

D. Lining Thickness Measurement.

1. Thickness measurements are performed using a calibrated wet film thickness gauge following application of the epoxy coating, or by using a dry film thickness

gauge/probe after the coating has set and/or has cured. Minimum recommended coating thickness is 7 mils average on all pipe sides. Use of 100% solids coatings eliminates any shrinkage of the coating following application (i.e., wet mil film thickness = dry mil film thickness).

E. Protection of the Coating.

1. The epoxy coating should be protected from excessive heat and moisture while curing. Epoxy coated pipe may be placed into service after continuous drying for 12 – 24 hours at approximately 70-75 degrees (F) minimum. Longer cure times may be required in areas where piping is subject to more severe (e.g., seasonal) and less-controllable environments (e.g., underground pipe, outdoor installations, etc.).

F. Visual Examination.

1. After drying and curing, the epoxy coating consists of a minimum of one coat (7 mils thickness) over the entire substrate and shall not contain any of the following:
   a. Blisters
   b. Cracks
   c. Chips or loosely particles
   d. Oil or other contaminants
   e. Fisheyes, pinholes, voids, or holidays

END OF SECTION

SECTION 23 01 00

GENERAL REQUIREMENTS FOR MECHANICAL WORK

PART 1 - GENERAL

1.1 SCOPE

A. This project involves construction of the project as titled above with associated site work as shown on the plans and described herein.

1.2 DRAWINGS

A. Contract drawings are diagrammatic only and do not give fully dimensioned locations of various elements. Contractor shall determine exact locations from field measurements. Refer also to all architectural, structural, etc., drawings. The lack of specific detail of all offsets, transitions, etc., shall not relieve the Contractor of responsibility to provide such necessary elements to coordinate his work with building construction and with other trades.

1.3 SUBSTITUTION

A. All bids shall be based only on the equipment and materials as scheduled on the drawings and/or as specified, or on equivalent equipment and materials from a pre-approved alternative manufacturer. No bids may be based on a substitute or other alternative without specific written prior approval from the Engineer. Any Bidder who assumes equivalence of products and who bases his/her bid on that assumption, does so at their own risk.

B. A listing of approved alternative manufacturers does not mean that all products of a particular alternative manufacturer are acceptable alternatives to the scheduled items; it merely means that for bidding prior approval is not required. All fixtures and devices must still be submitted according to the prescribed procedures. In addition, some items that have an important visual affect, e.g. electric water coolers, may be required to receive Engineer's or Owner's approval also.

C. Substitute equipment, components, devices and systems shall be fully compatible with the design intent and complete with all required costs included in the bid amount. This includes all modifications to support, structure, pipe and electrical sizing and components needed and all other items necessary for the substitute to perform with no additional cost to the project.

1.4 INTENT

A. All equipment, materials and labor that may be necessary to complete work in accordance with the intent of these plans and specifications shall be furnished by the Contractor without additional cost.

B. All systems represented in the documents shall, unless specifically noted to the contrary, be provided and installed complete with all necessary components to form a complete and functioning system. Submission of bids will be considered confirmation that complete and functional systems have been included in the bids.

C. If any discrepancies or confusion is perceived in the documents, the Contractor shall call such to the attention of the Engineer for clarification of the documents prior to bidding or construction. If any inconsistencies or contradictions within the construction documents are

discovered after the construction contracts are awarded, the Engineer shall determine the intent and correct interpretation of the construction documents.

D. Contractor shall supervise and direct the work competently and efficiently and in accordance with the drawings and specifications. Contractor shall be responsible for using construction means, methods, techniques, sequences, and procedures as are compatible with the project's requirements and will result in a project completed in accordance with the requirements of the drawings and specifications.

1.5 CODES, PERMITS AND FEES

A. Contractor shall comply with all local, state and national codes and shall pay for all applicable costs, fees and permits.

1.6 CONNECTION TO UTILITIES

A. Coordinate connections to utilities directly with utility providers.

B. Verify location, size, elevation, pressure, and any other pertinent data of existing utilities. Additional costs incurred due to a failure to verify such data and to coordinate associated work with respective utility providers shall be borne by Contractor.

C. All costs associated with providing utilities including, but not limited to, connection fees, boring under roads, etc., shall be included in the Contractor's bid price whether such costs are incurred by Contractor or charged by a utility company.

D. Submission of a bid by a Contractor shall be considered an acknowledgment by the Contractor of his compliance with this section.

E. Contractor shall connect water and waste piping and gas service to existing services in accordance with utility company regulations and shall pay all applicable fees and costs. NOTE: Excavate by hand and with caution to locate all utilities prior to machine excavation. Should any service be interrupted, Contractor shall repair it immediately and at no cost to the Owner.

1.7 VIBRATION AND NOISE

A. Each of the various pieces of equipment shall operate without objectionable vibration or noise. All rotating equipment shall be statically and dynamically balanced and shall be mounted, supported, and fastened so that vibration shall not exceed levels specified for the equipment item. The specific type of vibration isolation to be installed shall be submitted to the Engineer for his approval.

B. If, in the opinion of the Engineer, objectionable vibration or noise or transmission thereof to the building occurs, the Contractor shall execute remedial measures as may be necessary to eliminate such unsatisfactory operating conditions, and the work and material thereby required shall be furnished and performed at the Contractor's expense.

1.8 GUARANTEE

A. Each Contractor shall guarantee all labor and materials furnished by him for a period of one year unless otherwise noted. Guarantee period shall extend from the time of final written acceptance of the installation or upon usage by a written directive from the Owner, whichever occurs first. The guarantee shall cover the repair or replacement, without additional cost to the Owner, of any defective material or faulty workmanship.

1.9 SERVICE

A. All necessary service of each system, such as adjustment of controls, air distribution, and water balancing valves, mechanical repair of equipment, 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.

1.10 SAFETY

A. General
   1. Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the work, and Contractor shall comply with all laws governing safety, specifically the "Occupational Safety and Health Standards" and the "Safety and Health Regulations for Construction", state and federal.

B. Hazardous Chemicals
   1. According to OSHA, a hazardous chemical is any chemical which is a physical hazard or a health hazard. This may include items such as paints, solvents, adhesives, sealants, cleaners, etc. If a contractor produces, uses, or stores hazardous chemicals at the workplace, then contractor shall develop, implement, and maintain a hazard communication program in compliance with latest OSHA requirements. In projects with multiple tenants in which the building is partially occupied during the project, contractor shall inform the building manager or owner, according to OSHA guidelines, of any hazardous chemicals being produced, stored, or used in the building so that other tenants may be notified. Contractor shall employ required methods of training, information, handling, ventilation, labeling, storing, disposal, and removal of hazardous chemicals.

1.11 COORDINATION

A. Each Contractor's bid shall include the necessary detail and interconnection work to coordinate his work with the work of other trades. Failure on the part of the Contractor to coordinate with all other trades resulting in interferences shall be sufficient reason to require the Contractor to replace or rebuild the work involved at no extra charge.

1.12 STORAGE OF MATERIALS

A. Each Contractor shall provide temporary storage facilities suitable for equipment stored at the job site. Storage facilities shall be rain-proof and lockable as required. Materials or equipment stored on site but not in a lockable, rain-proof storage facility shall be stored above ground or above slab. Contractor shall take necessary precautions to prevent entry of and/or damage from dirt, trash, water, or vermin. Equipment not properly stored and protected shall be, at the discretion of the Engineer, replaced at no cost to Owner. Roofs are not acceptable storage areas unless specifically allowed in writing by the Engineer.

PART 2 - PRODUCTS

2.1 SUBMITTALS

A. Provide submittal to the A/E within 45 days of commencement of the Contractor’s agreement with the Owner.

B. In addition, submit specific information on equipment, products, and principal materials specified. Indicate and provide names of manufacturers, catalog and model numbers, cut sheets, and such other supplementary information as necessary for evaluation. Include all

items mentioned by model number and/or manufacturer's name in the specifications or on the drawings, including but not limited to the following:

1. HVAC - All equipment, air devices, insulation, piping, valves, controls and other principal materials.

C. Prepare and submit large scale shop drawings (minimum ¼"= 1'-0") of the central mechanical room, central electrical room and each individual electrical room. These drawings shall show to scale the actual sizes of each piece of selected mechanical, plumbing and electrical equipment along with the required clearances for maintenance or removal/replacement. Provide bottom of pipe, duct, equipment or other such vertical obstructions. Provide sections where necessary and as requested by the Engineer for clarity to describe equipment heights, piping elevations and other such clearance issues. Drawings shall be prepared on maximum 30" X 42" sheets using AutoCad® 2008 format. Submit 6 copies of the drawing sheets and a compact disk with the drawing files.

D. Requirements for submittal
   1. Each submittal shall:
      a. bear a stamp or specific written indication that Contractor has reviewed and approved all submittals prior to submission to Engineer,
      b. have all information deleted by Contractor that pertains to the means and methods of construction or to the fabrication, assembly, installation, or erection process (approval by Engineer shall not extend to these areas unless specifically noted by Engineer),
      c. be clearly marked as to which specific piece of equipment is being submitted, by use of a permanent marker, stamp, etc., so as to distinguish it from other pieces of equipment that may occur on the same page,
      d. be clearly marked as to which available options are being submitted that are associated with a piece of equipment, and
      e. be complete with respect to quantities, dimensions, specific performance, materials, and similar data to enable Engineer to review the proposed equipment.
   2. Omission by Contractor of any of the above requirements for submittals will subject submittal to automatic rejection without review.
   3. Any submittals received by Engineer that were not requested shall be returned without review of any kind.

E. Substitutions
   1. In Addition, no substitution is allowable without Engineer's written approval ten days prior to bid due date (unless otherwise allowed by Engineer) unless the manufacturer is listed on the Drawings or in the specifications as being a pre-approved alternative manufacturer. Any submittal received without such written approval or prior approval is subject to unqualified rejection.
   2. Contractor's responsibility shall be to verify that submitted substitute equipment will fit in the space available. The Contractor's submittal for acceptance of the substitute shall include a written statement of whether or not such acceptance would require any subsequent or associated changes to the drawings or specifications. Any such changes shall be described in writing, briefly but completely.
   3. The Contractor shall be responsible for the cost of any such modifications due to substitution of materials or equipment for that which was specified or scheduled. The cost shall be complete, that is, it shall include the costs affect on any and all other trades.
   4. The Engineer may request shop drawings of mechanical rooms or systems of the substituted equipment.

F. Installation Instructions
   1. For certain products or systems as identified in subsequent specification sections, the Contractor shall, as required, provide copies of manufacturer's installation instructions with the submittal. When required as such, the installation instructions are considered part of the submittal and their omission may result in automatic rejection of the submittal.

Where more than one identical devices are scheduled, only one set of installation instructions needs to be submitted, e.g. if seven five-ton split system air conditioners are scheduled, only one five-ton unit installation instructions needs to be submitted. Similarly, if one set of installation instructions is identified by the manufacturer and on the instructions to be applicable to more than one type or size of devices, e.g. if one set of air conditioner instructions is good for three, four, and five-ton units, then only one instruction set is required for those devices.

2.2 MATERIALS

A. All materials shall be new and of the quality specified. Materials shall be free from defects. Where manufacturers' names are mentioned in these specifications or on the plans, it has been done in order to establish a standard of quality and construction.

B. Contractor will be responsible for transportation of his materials to and on the job, and will be responsible for the storage and protection of his materials and work until the final acceptance of the job. At the end of each work day, each Contractor is responsible for covering or protecting his work or materials that may be susceptible to damage even if such damage is the result of unforeseen causes, e.g. an overnight thunderstorm. Failure to do so will be sufficient cause for rejection of any item in question, and any such item shall be replaced at Contractor's expense.

C. Contractor shall verify that all pieces of equipment will fit through available openings in building and that all equipment can be installed without modification of building structure.

2.3 LABELING

A. Each device for which an independent testing authority has established a standard shall have affixed a label indicating its compliance and listing. Such independent testing authorities shall include, but not be limited to, the following:

A.D.C.	Air Diffusion Council
A.G.A.	American Gas Association
A.M.C.A.	Air Movement and Control Association
A.N.S.I.	American National Standards Institute
A.R.I.	Air-Conditioning and Refrigeration Institute
A.S.H.R.A.E.	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
A.S.M.E.	American Society of Mechanical Engineers
A.S.P.E.	American Society of Plumbing Engineers
A.S.S.E.	American Society of Sanitary Engineers
A.S.T.M.	American Society for Testing and Materials
A.W.W.A.	American Water Works Association
C.T.I.	Cooling Tower Institute
F.M.	Factory Mutual
I.A.P.M.O.	International Association of Plumbing and Mechanical Officials
I.C.B.O.	International Conference of Building Officials
M.S.S.	Manufacturers Standardization Society of the Valve and Fittings Industry
N.A.P.H.C.C.	National Association of Plumbing, Heating, Cooling Contractors
N.B.S.	National Bureau of Standards
N.E.B.B.	National Environmental Balancing Bureau
N.E.C.	National Electric Code
N.E.M.A.	National Electrical Manufacturers Association
N.F.P.A.	National Fire Protection Association
N.R.C.A.	National Roofing Contractors Association
N.S.F.	National Sanitation Foundation

P.D.I.	Plumbing and Drainage Institute
S.B.C.C.I.	Southern Building Code Congress International
S.M.A.C.N.A.	Sheet Metal and Air Conditioning Contractors' National Association
T.I.M.A.	Thermal Insulation Manufacturers Association
U.L.	Underwriters Laboratory

2.4 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Section 01 78 23 Operation and Maintenance Data.

B. Contractor shall prepare and provide four copies of operating and maintenance manuals. Contractor shall deliver these four bound sets to the Engineer for approval. Each manual shall be in a ring binder and shall be indexed with dividers for each section. Delivery of required documents is a condition of final acceptance.

C. Each manual shall contain at least the following:
   1. Certificates of acceptance from inspecting authorities,
   2. Waiver of all liens,
   3. For each piece of equipment:
      a. operating and safety instructions, service manuals, and parts lists applicable to each item of equipment furnished (Contractor shall clearly distinguish in the manual between information that pertains to the particular equipment and information which does not.),
      b. nameplate data and design parameters for equipment,
      c. name, phone number, and address of vendor, manufacturer's representative, and warrantee provider,
      d. start-up report, if applicable,
   4. copies of all shop drawings and as-built drawings (as-built drawings shall be on a reproducible vellum as produced by a xerox or photographic process),
   5. copies of all approved submittals,
   6. warranties with start dates and end dates for each piece of equipment and/or for each system (warranties shall begin on date of substantial completion and acceptance by Owner),
   7. names, phone numbers and addresses of all subcontractors, vendors, manufacturer's representatives, and warrantee providers,
   8. certification letter from each Contractor that each system furnished and installed by that Contractor and/or Subcontractors is started-up, balanced, adjusted and checked for proper operation in accordance with the intent of the contract documents, and
   9. acceptance letter from each Contractor with blanks for date of acceptance and date of expiration of warranties and guarantees.

2.5 TAGGING

A. Equipment to be Tagged: Each major piece of equipment discussed in the specifications or scheduled on the drawings shall have affixed a tag showing the name or function of that piece. The list of equipment to receive tags shall include, but not be limited to, the following:
   1. air moving or air conditioning equipment,
      a. air handlers,
      b. heat pump units,
      c. fan-coil units,
      d. exhaust fans,
      e. variable air volume boxes
   2. valves,
      a. tag shall indicate function such as "domestic cold water shut-off", "domestic hot water shut-off", "chilled water shut-off", etc.,

b. tag shall be attached with brass chain,
c. exceptions that need no tag:
(1) control valves for HVAC at or near coils,
(2) shut-off valves near to and serving only one device such as a plumbing fixture or a fan-coil unit,
(3) isolation valves located at or near the device being isolated,
3. Items which have no unique name, such as air devices, plumbing fixtures, lights, etc., need not have tags.

B. Tags
1. Material - Tags shall be engraved plastic, brass, or anodized aluminum. Surface mounted tags shall have pressure sensitive adhesive backing. Tags for outdoor use shall be mounted with brass screws.
2. Lettering - Characters shall be minimum 1/4" in height and shall be of a contrasting color to the tag.
3. Installation - Surface mounted tags with adhesive backs shall be applied only to clean, dry surfaces. Adhesive tags shall not be applied to surfaces that are subject to condensation or excessive heat.

C. Alternatives
1. For larger equipment such as large air handlers, switchgear, etc., the use of manufactured stencils (2 inch characters) and spray paint (in contrasting color to equipment) is an acceptable alternative.
2. Individual adhesive letters are not acceptable.
3. Other alternatives are acceptable only by submitting samples or manufacturer's literature to Engineer and receiving written permission.

2.6 MOTORS AND MOTOR STARTERS

A. Motors
1. Unless scheduled otherwise, each electric motor shall be high efficiency type.
2. Each single phase motor larger than 1/10 (one-tenth) horsepower and each single phase motor that drives a pump or compressor shall be a permanent split capacitor type. Each polyphase squirrel-cage induction motor shall be an energy efficient type as defined in NEMA document No. MG1-1987.

B. Motor Connections
1. Motor starters, unless scheduled otherwise or packaged with the equipment, shall be provided and installed by the Electrical Contractor. The Mechanical Contractor shall provide to the Electrical Contractor a complete list of motors requiring starters or other connections, including power and control, and shall include the following information for each such motor:
a. a tag reference to the piece of equipment for which the motor is needed,
b. the voltage and number of phases,
c. the motor requirements in terms of horsepower, running load amps, full load amps, etc.,
d. any other pertinent information required or requested by the Electrical Contractor.
2. The Electrical Contractor shall receive and review the above information and advise the Mechanical Contractor and Engineer of any discrepancies or required modifications. The Electrical Contractor shall provide and install the correct starter, conductors, and other devices per the electrical drawings, specifications, and National Electrical Code.

PART 3 - EXECUTION

3.1 WORKMANSHIP

A. The workmanship shall, in all respects, be of the highest grade, and all construction shall be done according to the best practices of the trade. Piping, ducting and conduit shall be concealed unless otherwise noted, and installed square to the building lines. Any work not meeting this requirement shall be replaced or rebuilt without extra expense to the Owner.

3.2 INTERIM CLEANING

A. The Contractor shall maintain the work area in a clean condition during the course of the work. All debris, scrap and surplus material shall be removed from the work area on a periodic basis with a minimum of at least once per day.

B. All stored material shall be support above floor level and be protected from becoming damaged or dirty.

C. All installed material shall have open ends closed and protected from entrance of foreign material during construction.

D. Prior to enclosing an area such as a ceiling or chase wall, the installed material and surrounding area shall be thoroughly cleaned. After removing loose material, the area shall be vacuum cleaned or blown out with a portable blower to remove dust from surfaces.

3.3 CUTTING, PATCHING, AND PENETRATIONS

A. No joists, beams, girders, columns, slabs, or other structural elements shall be cut, drilled, or altered in any way by the Contractor without first obtaining written permission and instructions from the Engineer.

B. Where cutting any non-structural element(s) of walls, floors or ceilings is necessary to permit the installation of any work under this contract, or to repair any defects that may appear up to the expiration of the guarantee, such cutting shall be done by Contractor with as little damage as reasonably possible to the element being cut, to adjacent elements, or to the work of other trades.

C. After the necessary work has been completed, the damage shall be repaired by the Contractor, who shall pay all costs of such cutting and patching. All patching or sealing of cuts, penetrations, etc., including final appearance of same, shall be done to the approval of the Engineer. In absence of specific finish instructions, provide finish to match adjacent surfaces.

D. Where a penetration or cutting of a ceiling, wall, or other building membrane is required or made, each such penetration or cut shall be made neatly with a cutting tool such as a saw, sharp knife, etc., and not with an impact tool such as a hammer, screwdriver, wrench, crowbar, etc. Each such penetration or cut shall be no larger than reasonably necessary, and penetrations in occupied or publicly accessible spaces shall have a chrome-plated escutcheon installed large enough to cover the entire opening.

E. Where a penetration is made in a fire-rated building assembly (wall, floor, ceiling, floor-ceiling, roof-ceiling, etc.) or in a membrane of a fire-rated assembly, and no specific firestopping assembly is shown on Drawings, Contractor shall provide and install a firestopping assembly or product as listed in the latest edition of U.L. Fire Resistance Directory. Firestopping assembly or product shall be appropriate for the size and material of the penetrating element, for the penetrated building element, for the presence or lack of insulation, for the size of the annulus around the penetrating element, etc.. Contractor shall include firestopping assembly

or product in submittals. Contractor shall review and verify fire-ratings of building assemblies as shown on Architectural plans. Lack of knowledge of a fire-rating of an building assembly shall not relieve Contractor of requirement to install firestopping.

3.4 EQUIPMENT AND PIPING SUPPORTS

A. All supporting systems for piping, equipment, and materials supported by the building structure shall be submitted to the Engineer for approval prior to purchase and installation.

B. Provide 3-1/2” (minimum, or as called out elsewhere) high concrete house keeping pads for all floor mounted equipment piping. Pad shall have chamfered edges and be painted to match the floor.

3.5 ACCESSIBILITY

A. Access Panels
   1. Access panels shall be provided wherever necessary for possible future replacement, adjustment, or maintenance of operating devices such as machinery, valves, dampers, switches, relays, etc., or to other critical non-operating devices such as pull boxes, inspection parts, gauges, etc. Such access panels shall be provided and installed by Contractor, whether or not shown on drawings, and shall be brought to the attention of Engineer for his approval of type, color, etc.. Where access is provided in rated members, the access panels shall be of a type that maintains the integrity of the member penetrated.

B. Access to Equipment
   1. All pipes, tubing, conduit, etc., including, but not limited to, chilled water and heating water piping, domestic cold water and hot water piping, fire sprinkler piping, waste and vent piping, drain piping of any type, electrical conduit, wiring not in conduit, and pneumatic control tubing shall be installed in such a way so as not to prevent and/or not to make unreasonably difficult the removal, operation, use, or maintenance of equipment, access panels or doors, pathways (especially in attics or crawl spaces), observation ports, measurement or balancing devices, junction boxes, etc.. If access for these purposes is prevented or made unreasonably difficult in the opinion of the Engineer, then the Contractor shall make modifications or repairs at no cost to anyone except the Contractor. Such modifications or repairs shall be considered neither complete nor adequate until the Engineer are satisfied that access for the above purposes is achieved.

3.6 FIELD REPORTS

A. The Contractor shall be required to respond all deficiency items noted in Field, Site Visit, Punch List and other such reports provided by the A/E. The response shall address each deficiency item in the same order as the report with annotations as to what was done to remedy the deficiency, who performed the work and when it was done.

3.7 OPERATING TESTS

A. General
   1. After all mechanical and electrical systems have been completed and put into operation, Contractor shall subject each system to an operating test under design conditions to ensure proper sequence and operation throughout the range of operation. All associated costs of such tests, including labor, fuel, apparatuses, piping, etc., shall be borne by the Contractor.
   2. Contractor shall make adjustments as required to ensure proper functioning of all systems. Special tests on individual systems are specified under individual sections. The

Contractor shall return to the project during the first year and in the opposite season from which the system was initially operated and shall check the proper operation of the mechanical and electrical systems. Contractor shall perform any adjustments or corrective procedures required for the proper operation of all systems.

B. Notification
   1. Contractor shall give the Engineer seven day's prior notification of any test so that the Engineer will have time to be present if he so desires.

C. Reports
   1. After each test is performed, the Contractor who performed the test shall prepare and issue a report to include the following information:

      a. Project name and location, date of the report,
      b. Contractor's name, address, and telephone number; if the Contractor performing the test is a Subcontractor, indicate also for whom the test is being performed, their name, address, telephone number, and a contact person's name,
      c. the date, or range of dates, of the test,
      d. the name of the Contractor's employee who was responsible for performing or for overseeing the performing of the test,
      e. a brief description of the system being tested,
      f. a brief description of the testing procedure,
      g. a summary of the test result(s),
      h. a brief assertion that the system was tested as stated and that the system complied with the requirements of the contract documents or those of the Authority Having Jurisdiction, whichever is the most stringent, and
      i. a hand-written date and signature of someone who has authority or responsibility from the company that performed test(s), and a hand-written brief note stating that the above information is true and accurate.
   2. If the tested system is tested in parts, then one report may be made after the last part is tested.
   3. The report shall be issued to the Engineer within five working days after the test is completed.
   4. Such reports shall be required of all mechanical or electrical systems which require tests for pressure, water tightness, flow, resistance, or conductivity.

D. Services of a Manufacturer's Representative
   1. Reports: For all major systems or equipment required by subsequent specifications sections to have tests or inspections by a manufacturer's representative, the manufacturer's representative shall prepare a written report to be sent to the Engineer for subsequent distribution to the Engineer, Owner, General Contractor, and to whomever else the Engineer deems necessary. The report shall include at least the following:
      a. date of the visit, name and title of the representative, name and location of the project,
      b. name and title of any observers,
      c. a brief description of the equipment being inspected and/or tested,
      d. a brief discussion of the quality of the installation including any important items (in the manufacturer's experience) that were done correctly, as well as any items that were done incorrectly or not to recommendations,
      e. a list of tests and/or inspections performed and the results of same, and
      f. a brief statement of whether the installation conforms to manufacturer's recommendations and/or requirements, and if not what is required to bring the installation into conformance.
   2. Deficiencies and Defects

a. Contractor shall be responsible for providing all labor and materials, at no cost to anyone except Contractor, to correct any deficiencies or defects reported by manufacturer's representative.
b. If, in the opinion of the manufacturer's representative, the deficiencies and defects are sufficiently serious, then Contractor shall arrange for, and bear all costs of, another inspection by manufacturer's representative after corrective measures have been taken.

3. The above process shall continue until the manufacturer's representative approves the installation.

3.8 INSTRUCTIONS FOR OWNER

A. Contractor shall instruct the Owner's operating personnel in the operation and maintenance of all mechanical equipment. Contractor shall furnish any special servicing tools required for maintenance.

3.9 DEMONSTRATION

A. Contractor shall conduct a demonstration of the installation upon completion of the work. Prior to this, all work shall have been completed, tested, balanced, and placed in operation. Qualified persons must be present at demonstration to operate all systems and prove the performance of the equipment. The schedule for this demonstration shall be coordinated with the Engineer.

3.10 CLEANUP

A. At substantial completion of the project, thoroughly clean all equipment and systems of all dirt, debris and foreign material.

B. This shall include cleaning coils and fans inside of air handlers, cleaning the interior of duct systems and wiping down the interior of all electrical equipment.

C. Remove all unused temporary wiring or construction lighting and power and all unused material from above the ceilings and from hidden recesses.

END OF SECTION

SECTION 23 05 03

PIPES AND TUBES FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Pipe and pipe fittings for the following systems:
1. Chilled water piping.
2. Drains and overflows
3. Unions and flanges.
4. Gauges
5. Air vents
6. Pressure/Temperature ports

1.2 REFERENCES

A. American Society of Mechanical Engineers:
1. ASME B16.3 – Malleable Iron Threaded Fittings.
2. ASME B16.4 – Gray Iron Threaded Fittings.
3. ASME B16.18 – Cast Copper Alloy Solder Joint Pressure Fittings.
4. ASME B16.22 – Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
5. ASME B16.26 – Cast Copper Alloy Fittings for Flared Copper Tubes.
6. ASME B31.1 – Power Piping.
7. ASME B31.9 – Building Services Piping.
8. ASME B36.10M – Welded and Seamless Wrought Steel Pipe.
9. ASME Section IX – Boiler and Pressure Vessel Code – Welding and Brazing Qualifications.

B. ASTM International:
1. ASTM A53/A53M – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
2. ASTM A234/A234M – Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
3. ASTM B32 – Standard Specification for Solder Metal.
4. ASTM B68 – Standard Specification for Seamless Copper Tube, Bright Annealed.
5. ASTM B68M – Standard Specification for Seamless Copper Tube, Bright Annealed (Metric).
6. ASTM B75 – Standard Specification for Seamless Copper Tube.
7. ASTM B75M – Standard Specification for Seamless Copper Tube (Metric).
8. ASTM B88 – Standard Specification for Seamless Copper Water Tube.
9. ASTM B88M – Standard Specification for Seamless Copper Water Tube (Metric).
10. ASTM B280 – Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
11. ASTM B584 – Standard Specification for Copper Alloy Sand Castings for General Applications.
12. ASTM F1476 – Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications.

C. American Welding Society:
   1. AWS A5.8 – Specification for Filler Metals for Brazing and Braze Welding.
   2. AWS D1.1 – Structural Welding Code – Steel.

1.3 SUBMITTALS

A. Shop Drawings: Indicate layout of piping systems, including equipment, critical dimensions, and sizes.

B. Product Data: Submit data on pipe materials and fittings. Submit manufacturers catalog information.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with ASME B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Furnish temporary end caps and closures on piping and fittings. Maintain in place until installation.

B. Store material elevated from floor level and maintain to prevent entry of debris, dirt and mud.

C. Protect piping from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

1.6 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 – PRODUCTS

2.1 CHILLED WATER ABOVE GROUND

A. Steel Pipe: ASTM A53/A53M, Schedule 40, black.
   1. Fittings: ASME B16.3, malleable iron or ASTM A234/A234M, forged steel welding type.
   2. Joints: Threaded for pipe 2 inch and smaller; welded or groove joint for pipe 2-1/2 inches and larger.

B. Steel Pipe: ASTM A53/A53M Schedule 40, black, cut grooved ends.
   1. Fittings: ASTM A395/A395M and ASTM A536 ductile iron, or ASTM A234/A234M carbon steel, grooved ends.
   2. Joints: Grooved mechanical couplings meeting ASTM F1476.
      a. Housing Clamps: ASTM A395/A395M and ASTM A536 ductile iron, enamel coated, compatible with steel piping sizes, flexible type.

b. Gasket: Elastomer composition for operating temperature range from –30 degrees F to 180degrees F.
c. Accessories: Stainless steel bolts, nuts, and washers.

C. Copper Tubing: ASTM B88, Type L hard drawn.
1. Fittings: ASME B16.18, cast brass, or ASME B16.22, solder wrought copper.
2. Joints: Solder, lead free, ASTM B32, 95-5 tin-antimony, or tin and silver, with melting range 430 to 535 degrees F. At Contractor's option, joints may be press type fittings similar and equivalent to ProPress.

D. Copper Tubing: ASTM B88, Type L hard drawn, rolled grooved ends.
1. Fittings: ASME B16.22 wrought copper and bronze, grooved ends.
2. Joints: Grooved mechanical couplings meeting ASTM F1476.
a. Housing Clamps: ASTM A395/A395M and ASTM A536 ductile iron, enamel coated, compatible with copper tubing sizes, to engage and lock designed to permit some angular deflection, contraction, and expansion.
b. Gasket: Elastomer composition for operating temperature range from –30 degrees F to 180 degrees F.
c. Accessories: Stainless steel bolts, nuts, and washers.

2.2 EQUIPMENT DRAINS AND OVERFLOWS

A. Copper Tubing: ASTM B88 Type DWV, hard drawn.
1. Fittings: ASME B16.18, cast brass, or ASME B16.22 solder wrought copper.
2. Joints: Solder, lead free, ASTM B32, 95-5 tin-antimony, or tin and silver, with melting range 430 to 535 degrees F.

2.3 UNIONS AND FLANGES

A. Unions for Pipe 2 inches and Smaller:
1. Ferrous Piping: Class 150, malleable iron, threaded.
2. Copper Piping: Class 150, bronze unions with soldered.
3. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

B. Flanges for Pipe 2-1/2 inches and Larger:
1. Ferrous Piping: Class 150, forged steel, slip-on or weld-neck flanges.
2. Copper Piping: Class 150, slip-on bronze flanges.
3. Gaskets: 1/16 inch thick preformed neoprene gaskets.

2.4 PRESSURE GAUGE AND GAUGE/SWITCH

A. Pressure gauge shall be Bourdon tube type, liquid-filled with rust and mildew inhibitor, with 4-1/2 inch white dial face, 1% or better accuracy, a 270 degree arc, and a 1000 psi minimum operating limit. Gauge shall be manufactured by Weiss, Weksler, Trerice, or approved equivalent.

B. Differential pressure gauge shall be manufactured by Orange Research or approved equivalent. Gauge shall be Model 1201PG piston/magnet type capable of withstanding 3000 psig line pressure. Unless scheduled otherwise, gauge shall have naval brass body, in-line porting, a 2" gauge face, and a bezel case.

C. The gauge range, in psig, shall be appropriate for the service intended. If the range is not shown on the drawings and the Contractor has any doubts, he shall request in writing the gauge range to use before ordering the gauge.

2.5 AIR VENTS

A. Automatic air vents with 1/2 inch ball valves shall be placed at all high points in closed loop chilled water and heating water lines in mechanical equipment room and mezzanine and shall be equal to Hoffman No. 79 with discharge pipe routed to nearest drain. Manual air vents consisting of a gauge cock shall be installed in all other high points in lines (over occupied spaces, corridors, etc.).

2.6 PRESSURE/TEMPERATURE TEST PORTS (PETE'S PLUGS)

A. General
1. Each test port body shall be made of solid brass with 1/2" male pipe threads and a brass cap with a brass chain or a plastic tab cap retainer. Valve shall be the dual seal type with two core inserts. Test ports in pipes to be insulated shall be of extended length or have extension fittings.
2. Accessories: Contractor shall provide to Owner a test port test kit consisting of the following:
a) (2) pressure gauges with 2-1/2" dial faces and ranges from 0 to 200 psi,
b) (2) gauge adapters,
c) (2) thermometers each with a 2" dial face, one with a range of 25 to 125 degrees F, and one with a range of 0 to 220 degrees F, and
d) carrying case.

PART 3 - EXECUTION

3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare piping connections to equipment with flanges or unions.

D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

3.2 INSTALLATION - ABOVE GROUND PIPING

A. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

B. Install piping to maintain headroom without interfering with use of space or taking more space than necessary.

C. Group piping whenever practical at common elevations.

D. Sleeve pipe passing through partitions, walls and floors.

E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

F. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

G. Provide access where valves and fittings are not accessible.

H. Install non-conducting dielectric connections wherever jointing dissimilar metals.

I. Slope piping and arrange systems to drain at low points.

J. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

K. Install piping penetrating roofed areas to maintain integrity of roof assembly.

L. Install valves in accordance with Section 23 05 23.

M. Insulate piping. Refer to Section 23 07 00.

N. Install pipe identification.

O. Seal all penetrations of walls, floors and ceiling or other similar surfaces with appropriate sealant material.

3.3 FIELD QUALITY CONTROL

A. Test water piping systems in accordance with ASME B31.9.

3.4 CLEANING

A. After completion, fill, clean, and treat chilled water piping system.

END OF SECTION

SECTION 23 05 13

COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes single- and three-phase motors for application on equipment provided under other sections and for motors furnished loose to Project.

1.2 REFERENCES

A. American Bearing Manufacturers Association:
1. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.

B. National Electrical Manufacturers Association:
1. NEMA MG 1 - Motors and Generators.

C. International Electrical Testing Association:
1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.3 SUBMITTALS

A. Product Data: Submit catalog data for each motor furnished loose. Indicate nameplate data, standard compliance, electrical ratings and characteristics, and physical dimensions, weights, mechanical performance data, and support points.

B. Test Reports: Indicate procedures and results for specified factory and field testing and inspection.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Lift only with lugs provided. Handle carefully to avoid damage to components, enclosure, and finish.

B. Protect products from weather and moisture by covering with plastic or canvas and by maintaining heating within enclosure.

C. For extended outdoor storage, remove motors from equipment and store separately.

PART 2 - PRODUCTS

2.1 PRODUCT REQUIREMENTS FOR MOTORS FURNISHED WITH EQUIPMENT

A. Manufacturers:
1. Cooper Industries Inc.
2. Eaton Corp.
3. Gould
4. U.S. Motor
5. Lincoln Electric
6. Baldor
7. General Electric Co.

B. Motors 3/4 hp and Larger: Three-phase motor as specified below.

C. Motors Smaller Than 3/4 hp: Single-phase motor as specified below, except motors less than 250 watts or 1/4 hp may be equipment manufacturer's standard.

D. Three-Phase Motors: NEMA MG 1, Design B, premium efficiency squirrel-cage induction motor, with windings to accomplish starting methods and number of speeds.
1. Voltage: As indicated on Drawings.
2. Service Factor: 1.15.
3. Enclosure: Meet conditions of installation unless specific enclosure is indicated on Drawings.
4. Design for continuous operation in 40 degrees C environment, with temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
5. Insulation System: NEMA Class F.
6. Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.
7. Thermistor System (Motor Frame Sizes 254T and Larger): Three PTC thermistors embedded in motor windings and epoxy encapsulated solid state control relay with wiring to terminal box.
8. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum ABMA 9, L-10 life of 200,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
9. Sound Power Levels: Conform to NEMA MG 1.

E. Single Phase Motors:
1. Permanent split-capacitor type where available, otherwise use split-phase start/capacitor run or capacitor start/capacitor run motor.
2. Voltage: 115/208 volts, single phase, 60 Hz.

F. Wiring Terminations: Furnish terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated.

2.2 SOURCE QUALITY CONTROL

A. Test motors in accordance with NEMA MG 1, including winding resistance, no-load speed and current, locked rotor current, insulation high-potential test, and mechanical alignment tests.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.

B. Ground and bond motors in accordance with Section 26 05 26.

END OF SECTION

SECTION 23 05 23

GENERAL DUTY VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Ball valves.
2. Plug valves.
3. Globe valves
4. Gate valves
5. Butterfly valves.
6. Check valves.

1.2 REFERENCES

A. ASTM International:
1. ASTM A216/A216M - Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service.

B. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP 67 - Butterfly Valves.
2. MSS SP 71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends.
3. MSS SP 78 - Cast Iron Plug Valves, Flanged and Threaded Ends.
4. MSS SP 80 - Bronze Gate, Globe, Angle and Check Valves.
5. MSS SP 85 - Cast Iron Globe & Angle Valves, Flanged and Threaded.
6. MSS SP 110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

1.3 SUBMITTALS

A. Product Data: Submit manufacturers catalog information with valve data and ratings for each service.

B. Manufacturer's Installation Instructions: Submit hanging and support methods, joining procedures.

C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 78 00 - Execution and Closeout Requirements: Requirements for submittals.

B. Operation and Maintenance Data: Submit installation instructions, spare parts lists, exploded assembly views.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

1.6 WARRANTY

A. Section 23 01 00 – General Requirements: Guarantee.

PART 2 - PRODUCTS

2.1 BALL VALVES

A. Manufacturers:
1. Crane Valve, North America
2. Hammond Valve 8301.
3. Milwaukee Valve Company.
4. NIBCO, Inc. T-585-70
5. Stockham Valves & Fittings.
6. Jomar T-100
7. Apollo 77-100
8. Watts B-6080

B. 2 inches and Smaller: MSS SP 110, 400 psi WOG, two piece bronze body, chrome plated brass ball, full port, teflon seats, blow-out proof stem, threaded ends, extended lever handle.

2.2 PLUG VALVES

A. Manufacturers:
1. DeZURIK, Unit of SPX Corp. Model.
2. Flow Control Equipment, Inc. Model.

B. 2 inches and Smaller: MSS SP 78, Class 150, semi-steel construction, rectangular port, pressure lubricated, teflon packing, threaded ends. Furnish one plug valve wrench for every ten plug-valves with minimum of one wrench.

C. 2-1/2 inches and Larger: MSS SP 78, Class 150semi-steel construction, rectangular port, pressure lubricated, teflon packing, flanged ends. Furnish wrench-operated.

2.3 BUTTERFLY VALVES

A. Manufacturers:
1. Crane Valve, North America Model.
2. Hammond Valve Model.
3. Milwaukee Valve Company Model.
4. NIBCO, Inc. Model.
5. Stockham Valves & Fittings.
6. DeZURIK

B. 2-1/2 inches and Larger: MSS SP 67, Class 150.
1. Body: Cast or ductile iron, lug or grooved ends, stainless steel stem, extended neck.
2. Disc: Aluminum bronze or stainless steel.

3. Seat: Resilient replaceable Buna N or neoprene Viton.
4. Handle and Operator: 10 position lever handle.

2.4 GATE and GLOBE VALVES

A. Manufacturers:
1. Crane Valve, North America Model.
2. Hammond Valve Model.
3. Milwaukee Valve Company Model.
4. NIBCO, Inc. Model.
5. Stockham Valves & Fittings

B. Gate: 2 inches and smaller
1. Rated for 125 psi steam. MSS SP 80, Class 200, bronze body, bronze trim, union bonnet, rising stem, hand-wheel, solid wedge disc, stainless steel rings, threaded ends.

C. Globe: 2 inches and smaller
1. MSS SP 80, Class 200, bronze body, bronze trim, union bonnet, rising stem, hand wheel, renewable stainless steel seat ring and disc, threaded ends.

2.5 CHECK VALVES

A. Horizontal Swing Check Valves:

1. Manufacturers:
a. Crane Valve, North America.
b. Hammond Valve.
c. Milwaukee Valve Company.
d. NIBCO, Inc. Model.
e. Stockham Valves & Fittings.
2. 2 inches and Smaller: MSS SP 80, Class 150, bronze body and cap, bronze seat, Buna-N disc, threaded ends.
3. 2-1/2 inches and Larger: MSS SP 71, Class 125, cast iron body, bolted cap, bronze or cast iron disc, renewable disc seal and seat, flanged ends.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify piping system is ready for valve installation.

3.2 INSTALLATION

A. Install valves with stems upright or horizontal, not inverted.

B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

C. Install 3/4 inch ball valves with cap for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment.

D. Install valves with clearance for installation of insulation and allowing access.

E. Provide access where valves and fittings are not accessible.

3.3 VALVE APPLICATIONS

A. Install shutoff and drain valves at locations indicated on Drawings in accordance with this Section.

B. Install ball or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.

C. Install plug, ball or butterfly valves for throttling, bypass, or manual flow control services.

D. Install lug end butterfly valves adjacent to equipment when functioning to isolate equipment.

E. Install ball or butterfly valves in chilled for shut-off service.

F. Install plug valves in chilled for throttling service.

G. Install gate valves for steam and steam condensate.

END OF SECTION

SECTION 23 05 29

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Pipe hangers and supports.
2. Hanger rods.
3. Inserts.
4. Flashing.
5. Equipment curbs.
6. Sleeves.
7. Mechanical sleeve seals.
8. Formed steel channel.
9. Firestopping relating to HVAC work.
10. Firestopping accessories.
11. Equipment bases and supports.

1.2 REFERENCES

A. American Society of Mechanical Engineers:
1. ASME B31.1 - Power Piping.
2. ASME B31.5 - Refrigeration Piping.
3. ASME B31.9 - Building Services Piping.

B. ASTM International:
1. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM E119 - Method for Fire Tests of Building Construction and Materials.
3. ASTM E814 - Test Method of Fire Tests of Through Penetration Firestops.
4. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.
5. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.

C. American Welding Society:
1. AWS D1.1 - Structural Welding Code - Steel.

D. FM Global:
1. FM - Approval Guide, A Guide to Equipment, Materials & Services Approved By Factory Mutual Research For Property Conservation.

E. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
2. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.
3. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

F. Underwriters Laboratories Inc.:
1. UL 263 - Fire Tests of Building Construction and Materials.
2. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
3. UL 1479 - Fire Tests of Through-Penetration Firestops.

4. UL 2079 - Tests for Fire Resistance of Building Joint Systems.
5. UL - Fire Resistance Directory.

G. Intertek Testing Services (Warnock Hersey Listed):
1. WH - Certification Listings.

1.3 DEFINITIONS

A. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction. Install in strict accordance with manufacturers listing instructions.

1.4 SUBMITTALS

A. Shop Drawings: Indicate system layout with location including critical dimensions, sizes, and pipe hanger and support locations and detail of trapeze hangers.

B. Product Data:
1. Hangers and Supports: Submit manufacturers catalog data including load capacity.
2. Firestopping: Submit data on product characteristics, performance and limitation criteria.

C. Firestopping Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.

D. Design Data: Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers. Indicate calculations used to determine load carrying capacity of trapeze, multiple pipe, and riser support hangers.

E. Manufacturer's Installation Instructions:
1. Hangers and Supports: Submit special procedures and assembly of components.
2. Firestopping: Submit preparation and installation instructions.

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

G. Engineering Judgments: For conditions not covered by UL or WH listed designs, submit judgments by licensed professional engineer suitable for presentation to authority having jurisdiction for acceptance as meeting code fire protection requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

B. Protect from weather and construction traffic, dirt, water, chemical, and damage, by storing in original packaging.

1.6 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.7 WARRANTY

A. Section 23 01 00 – General Requirements: Guarantee

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Manufacturers:
1. Carpenter & Paterson Inc.
2. Creative Systems Inc.
3. Flex-Weld, Inc.
4. Globe Pipe Hanger Products Inc.
5. Michigan Hanger Co.
6. Superior Valve Co.
7. Fee and Mason.
8. B-Line.
9. Grinnell.

B. Hydronic Piping:
1. Conform to ASME B31.9.
2. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron or Carbon steel, adjustable swivel, split ring.
3. Hangers for Hot Pipe Sizes 2 to 4 inches: Carbon steel, adjustable, clevis.
4. Hangers for Hot Pipe Sizes 6 inches and Larger: Adjustable steel yoke, cast iron roll, double hanger.
5. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
6. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 inches and Larger: Steel channels with welded spacers and hanger rods, cast iron roll.
7. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hooks.
8. Wall Support for Pipe Sizes 4 inches and Larger: Welded steel bracket and wrought steel clamp.
9. Wall Support for Hot Pipe Sizes 6 inches and Larger: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
10. Vertical Support: Steel riser clamp.
11. Roof Support for Pipe Sizes 2 inches and Smaller: Polypropylene (UV Stabilized) Pad type support with adjustable height hot dipped galvanized formed steel channel support. Portable Pipe Hanger SS8-C or similar. Secure pad to roof with mastic compatible with roofing system (verify with roof material supplier). Clamp piping to channel.
12. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
13. Copper Pipe Support: Copper-plated, carbon steel ring.

2.2 ACCESSORIES

A. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded.

2.3 INSERTS

A. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.4 FLASHING

A. Metal Flashing: 22 gage thick galvanized steel.

B. Metal Counterflashing: 22 gage thick galvanized steel.

C. Lead Flashing:
1. Waterproofing: 5 lb./sq. ft sheet lead.
2. Soundproofing: 1 lb./sq. ft sheet lead.

D. Flexible Flashing: 47 mil thick sheet butyl; compatible with roofing.

E. Caps: Steel, 22 gage minimum; 16 gage at fire resistant elements.

2.5 EQUIPMENT CURBS

A. Manufacturers:
1. Pate.
2. Thycurb
3. Substitutions: Section 01 60 00 - Product Requirements.

B. Fabrication: Welded 18 gage galvanized steel shell and base, mitered 3 inch cant, variable step to match root insulation, 1-1/2 inch thick insulation, factory installed wood nailer.

2.6 SLEEVES

A. Sleeves for Pipes Through Non-fire Rated Floors: 18 gage thick galvanized steel.

B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage thick galvanized steel.

C. Sleeves for Round Ductwork: Galvanized steel.

D. Sleeves for Rectangular Ductwork: Galvanized steel.

2.7 MECHANICAL SLEEVE SEALS

A. Manufacturers:
1. Thunderline Link-Seal, Inc.
2. NMP Corporation.

B. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.8 FORMED STEEL CHANNEL

A. Manufacturers:
1. Allied Tube & Conduit Corp.
2. B-Line Systems
3. Midland Ross Corporation, Electrical Products Division.
4. Unistrut Corp.
5. Powerstrut
6. Kindorf

B. Product Description: Galvanized 12 gage thick steel. With holes 1-1/2 inches on center.

2.9 FIRESTOPPING

A. Manufacturers:
1. Dow Corning Corp.
2. Fire Trak Corp.
3. Hilti Corp.
4. International Protective Coating Corp.
5. 3M fire Protection Products.
6. Specified Technology, Inc.

B. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.

1. Silicone Elastomeric Firestopping: Single component silicone elastomeric compound and compatible silicone sealant.
2. Foam Firestopping Compounds: Single component foam compound.
3. Formulated Firestopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non-asbestos fibers.
4. Fiber Stuffing and Sealant Firestopping: Composite of mineral or ceramic fiber stuffing insulation with silicone elastomer for smoke stopping.
5. Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
6. Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.
7. Firestop Pillows: Formed mineral fiber pillows.

2.10 FIRESTOPPING ACCESSORIES

A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.

B. Dam Material: Permanent:
1. Mineral fiberboard.
2. Mineral fiber matting.
3. Sheet metal.
4. Plywood or particle board.
5. Alumina silicate fire board.

C. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.

D. General:
   1. Furnish UL listed products or products tested by independent testing laboratory.
   2. Select products with rating not less than rating of wall or floor being penetrated.

E. Non-Rated Surfaces:
   1. Stamped steel, chrome plated, hinged, split ring escutcheons or floor plates or ceiling plates for covering openings in occupied areas where piping is exposed.
   2. For exterior wall openings below grade, furnish mechanical sealing device to continuously fill annular space between piping and cored opening or water-stop type wall sleeve.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify openings are ready to receive sleeves.

B. Verify openings are ready to receive firestopping.

3.2 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.

B. Remove incompatible materials affecting bond.

C. Install backing and damming materials to arrest liquid material leakage.

D. Obtain permission from Engineer before using powder-actuated anchors.

E. Do not drill or cut structural members.

3.3 INSTALLATION - INSERTS

A. Install inserts for placement in concrete forms.

B. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches and larger.

D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

E. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

3.4 INSTALLATION - PIPE HANGERS AND SUPPORTS

A. Install in accordance with ASME B31.1, ASME B31.5, ASME 31.9.

B. Support horizontal piping as scheduled.

C. Install hangers with minimum 1/2 inch space between finished covering and adjacent work.

D. Place hangers within 12 inches of each horizontal elbow.

E. Use hangers with 1-1/2 inch minimum vertical adjustment.

F. Support vertical piping at every floor.

G. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.

H. Support riser piping independently of connected horizontal piping.

I. Provide copper plated hangers and supports for copper piping.

J. Design hangers for pipe movement without disengagement of supported pipe.

K. Prime coat exposed steel hangers and supports. Refer to Section 09 90 00. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

L. Provide clearance in hangers and from structure and other equipment for installation of insulation. Refer to Section 22 07 00.

3.5 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

A. Provide housekeeping pads of concrete, minimum 3-1/2 inches thick and extending 6 inches beyond supported equipment.

B. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.

C. Construct supports of steel members or formed steel channel. Brace and fasten with flanges bolted to structure.

D. Provide rigid anchors for pipes after vibration isolation components are installed.

3.6 INSTALLATION - FLASHING

A. Provide flexible flashing and metal Counterflashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.

B. Provide acoustical lead flashing around ducts and pipes penetrating equipment rooms for sound control.

C. Provide curbs for roof installations 14 inches minimum high above roofing surface. Flash and counter-flash with sheet metal; seal watertight. Attach Counterflashing to equipment and lap base flashing on roof curbs. Flatten and solder joints.

D. Adjust storm collars tight to pipe with bolts; caulk around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.

3.7 INSTALLATION - SLEEVES

A. Exterior watertight entries: Seal with mechanical sleeve seals.

B. Set sleeves in position in forms. Provide reinforcing around sleeves.

C. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

D. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.

E. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with firestopping insulation and caulk. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

F. Install chrome plated steel or stainless steel escutcheons at finished surfaces.

3.8 INSTALLATION - FIRESTOPPING

A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, and other items, requiring firestopping.

B. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.

C. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating in accordance with the product listing.

D. Non-Rated Surfaces:
   1. Seal opening through non-fire rated wall, partition, floor, ceiling, and roof opening as follows:
      a. Install sleeve through opening and extending beyond minimum of 1 inch (25 mm) on both sides of building element.
      b. Size sleeve allowing minimum of 1 inch (25 mm) void between sleeve and building element.
      c. Install type of firestopping material recommended by manufacturer.
   2. Install escutcheons where pipe, penetrates non-fire rated surfaces in occupied spaces. Occupied spaces include rooms with finished ceilings and where penetration occurs below finished ceiling.
   3. Exterior wall openings below grade: Assemble rubber links of mechanical sealing device to size of piping and tighten in place, in accordance with manufacturer's instructions.
   4. Interior partitions: Seal pipe penetrations at clean rooms, laboratories, medical spaces, computer rooms, telecommunication rooms, and data equipment rooms. Apply sealant to both sides of penetration to completely fill annular space between sleeve and pipe.

3.9 FIELD QUALITY CONTROL

A. Inspect installed firestopping for compliance with specifications and submitted schedule.

3.10 CLEANING

A. Clean adjacent surfaces of firestopping materials.

3.11 PROTECTION OF FINISHED WORK

A. Protect adjacent surfaces from damage by material installation.

3.12 SCHEDULES

A. Copper and Steel Pipe Hanger Spacing:

PIPE SIZE Inches (mm)	COPPER TUBING MAXIMUM HANGER SPACING Feet (m)	STEEL PIPE MAXIMUM HANGER SPACING Feet (m)	COPPER TUBING HANGER ROD DIAMETER Inches (mm)	STEEL PIPE HANGER ROD DIAMETER Inches (mm)
1/2 (12)	5 (1.5)	7 (2.1)	3/8 (9)	3/8 (9)
3/4 (20)	5 (1.5)	7 (2.1)	3/8 (9)	3/8 (9)
1 (25)	6 (1.8)	7 (2.1)	3/8 (9)	3/8 (9)
1-1/4 (32)	7 (2.1)	7 (2.1)	3/8 (9)	3/8 (9)
1-1/2 (38)	8 (2.4)	9 (2.7)	3/8 (9)	3/8 (9)
2 (50)	8 (2.4)	10 (3)	3/8 (9)	3/8 (9)
2-1/2 (65) (Note 2)	9 (2.7)	11 (3.4)	1/2 (13)	1/2 (13)
3 (75)	10 (3)	12 (3.7)	1/2 (13)	1/2 (13)
4 (100)	12 (3.7)	14 (4.3)	1/2 (13)	5/8 (15)

B. Note 1: Refer to manufacturer’s recommendations for grooved end piping systems.

C. Note 2: 20 feet maximum spacing, minimum of one hanger for each pipe section close to joint behind bell. Provide hanger at each change of direction and each branch connection. For pipe sizes 6 inches and smaller, subjected to loadings other than weight of pipe and contents, limit span to maximum spacing for water service steel pipe.

END OF SECTION

SECTION 23 05 48

VIBRATION CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Vibration isolators.

1.2 REFERENCES

A. Air Movement and Control Association International, Inc.:
1. AMCA 300 - Reverberant Room Method for Sound Testing of Fans.

B. American National Standards Institute:
1. ANSI S1.4 - Sound Level Meters.
2. ANSI S1.8 - Reference Quantities for Acoustical Levels.
3. ANSI S1.13 - Methods for the Measurement of Sound Pressure Levels in Air.
4. ANSI S12.36 - Survey Methods for the Determination of Sound Power Levels of Noise Sources.

C. Air-Conditioning and Refrigeration Institute:
1. ARI 575 - Method of Measuring Machinery Sound within Equipment Space.

D. American Society of Heating, Refrigerating and:
1. ASHRAE 68 - Laboratory Method of Testing In-Duct Sound Power Measurement Procedure for Fans.
2. ASHRAE Handbook - HVAC Applications.

E. ASTM International:
1. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
2. ASTM E477 - Standard Test Method for Measuring Acoustical and Airflow Performance of Duct Liner Materials and Prefabricated Silencers.
3. ASTM E596 - Standard Test Method for Laboratory Measurement of the Noise Reduction of Sound-Isolating Enclosures.

F. Sheet Metal and Air Conditioning Contractors':
1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

1.3 PERFORMANCE REQUIREMENTS

A. Provide vibration isolation on motor driven equipment over 0.5 hp (0.35 kW), plus connected piping and ductwork.

B. Provide minimum static deflection of isolators for equipment as follows:
1. Upper Floors
a. Under 400 rpm: 4 inches
b. 400 - 600 rpm: 3.5 inch
c. 600 - 800 rpm: 2 inch

d. 800 - 900 rpm: 1 inch
e. Over 1100 rpm: 0.5 inch

C. Consider upper floor locations critical unless otherwise indicated.

1.4 SUBMITTALS

A. Shop Drawings: Indicate inertia bases and locate vibration isolators, with static and dynamic load on each. Indicate assembly, materials, thickness, dimensional data, pressure losses, acoustical performance, layout, and connection details for sound attenuation products fabricated for this project.

B. Product Data: Submit schedule of vibration isolator type with location and load on each. Submit catalog information indicating, materials, dimensional data, pressure losses, and acoustical performance for standard sound attenuation products.

C. Design Data: Submit calculations indicating maximum room sound levels are not exceeded.

D. Manufacturer's Installation Instructions: Submit special procedures and setting dimensions. Indicate installation requirements maintaining integrity of sound isolation.

E. Manufacturer's Certificate: Certify isolators meet or exceed specified requirements.

F. Manufacturer's Field Reports: Indicate sound isolation installation is complete and in accordance with instructions.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of cross-talk silencers. Record actual locations of hangers including attachment points.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with AMCA 300, ANSI S1.13, ARI 575, ANSI S12.36 and standards and recommendations of ASHRAE 68.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

A. Manufacturers:
1. Fee and Mason
2. Amber-Booth

B. Open Spring Isolators:
1. Spring Isolators:
a. For Exterior and Humid Areas: Furnish hot dipped galvanized housings and neoprene coated springs.
b. Code: Color code springs for load carrying capacity.
2. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection.

3. Spring Mounts: Furnish with leveling devices, minimum 0.25 inch thick neoprene sound pads, and zinc chromate plated hardware.
4. Sound Pads: Size for minimum deflection of 0.05 inch; meet requirements for neoprene pad isolators.

C. Restrained Spring Isolators:
1. Spring Isolators:
   a. For Exterior and Humid Areas: Furnish hot dipped galvanized housings and neoprene coated springs.
   b. Code: Color code springs for load carrying capacity.
2. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection.
3. Spring Mounts: Furnish with leveling devices, minimum 0.25 inch thick neoprene sound pads, and zinc chromate plated hardware.
4. Sound Pads: Size for minimum deflection of 0.05 inch; meet requirements for neoprene pad isolators.
5. Restraint: Furnish mounting frame and limit stops.

D. Closed Spring Isolators:
1. Spring Isolators:
   a. For Exterior and Humid Areas: Furnish hot dipped galvanized housings and neoprene coated springs.
   b. Code: Color code springs for load carrying capacity.
2. Type: Closed spring mount with top and bottom housing separated with neoprene rubber stabilizers.
3. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection.
4. Housings: Incorporate neoprene isolation pad meeting requirements for neoprene pad isolators, and neoprene side stabilizers with minimum 0.25 inch clearance.

E. Restrained Closed Spring Isolators:
1. Spring Isolators:
   a. For Exterior and Humid Areas: Furnish hot dipped galvanized housings and neoprene coated springs.
   b. Code: Color code springs for load carrying capacity.
2. Type: Closed spring mount with top and bottom housing separated with neoprene rubber stabilizers.
3. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection.
4. Housings: Incorporate neoprene isolation pad meeting requirements for neoprene pad isolators, and neoprene side stabilizers with minimum 0.25 inch clearance and limit stops.

F. Spring Hanger:
1. Spring Isolators:
   a. For Exterior and Humid Areas: Furnish hot dipped galvanized housings and neoprene coated springs.
   b. Code: Color code springs for load carrying capacity.
2. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection.
3. Housings: Incorporate neoprene isolation pad meeting requirements for neoprene pad isolators and rubber hanger with threaded insert.
4. Misalignment: Capable of 20 degree hanger rod misalignment.

G. Neoprene Pad Isolators:

1. Rubber or neoprene-waffle pads.
   a. 30 durometer.
   b. Minimum 1/2 inch (13 mm) thick.
   c. Maximum loading 40 psi (275 kPa).
   d. Height of ribs: not to exceed 0.7 times width.
2. Configuration: Single layer. 1/2 inch (13 mm) thick waffle pads bonded each side of 1/4 inch (6 mm) thick steel plate.

H. Rubber Mount or Hanger: Molded rubber designed for 0.5 inch deflection with threaded insert.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify equipment, ductwork and piping is installed before work in this section is started.

3.2 INSTALLATION

A. Install isolation for motor driven equipment.

B. Bases:
1. Set steel bases for 1 inch clearance between housekeeping pad and base.
2. Set concrete inertia bases for 2 inch clearance between housekeeping pad and base.

C. Adjust equipment level.

D. Install spring hangers without binding.

E. On closed spring isolators, adjust so side stabilizers are clear under normal operating conditions.

F. Prior to making piping connections to equipment with operating weights substantially different from installed weights, block up equipment with temporary shims to final height. When full load is applied, adjust isolators to load to allow shim removal.

G. Support piping connections to isolated equipment resiliently to nearest flexible pipe connector as follows:
1. Up to 4 inch Diameter: First three points of support.
2. 5 to 8 inch Diameter: First four points of support.
3. Select three hangers closest to vibration source for minimum 1.0 inch static deflection or static deflection of isolated equipment. Select remaining isolators for minimum 1.0 inch static deflection or 1/2 static deflection of isolated equipment.

3.3 FIELD QUALITY CONTROL

A. Inspect isolated equipment after installation and submit report. Include static deflections.

END OF SECTION

SECTION 23 05 93

HVAC TEST AND BALANCE

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. The Contractor shall select and employ an impartial independent technical Balancing Contractor to provide balancing, testing, and adjusting services for the heating, ventilating, and air conditioning systems of this project.

B. The Balancing Contractor shall be responsible for the satisfactory execution of the balancing, testing, and adjusting of the HVAC systems.

C. The Contractor and the suppliers of the equipment installed shall provide all supervision, personnel, equipment and materials, and perform all work necessary to assist the Balancing (HVAC) Contractor in providing the balancing, testing and adjusting services for the heating, ventilating, and air conditioning (HVAC) systems of this project.

1.2 RELATED WORK

A. The Mechanical Contractor shall complete the installation, operate and test all HVAC systems to insure they are operating properly and shall perform all other items as required to assist the Balancing Contractor in performing the balancing, testing, and adjusting of the HVAC systems. The items shall include the following:

1. Building Status: Verify installation for conformity to design. All supply, return outside air and exhaust ducts terminated and pressure tested for leakage as required by specification.
2. Air Distribution Systems
   a) Verify installation for conformity to design. All supply, return and exhaust ducts terminated and pressure tested for leakage as required by specification.
   b) All volume, splitter, extractor and fire dampers properly located and functional. All volume, fire, smoke, and combination fire/smoke dampers shall be in the full open position. Dampers serving requirements of minimum and maximum outside air, return, relief and exhaust shall provide tight closure and full openings, smooth and free operation.
   c) All supply, return, exhaust, transfer grilles, registers, diffusers installed and operational.
   d) Air handling systems, units and associated apparatus, such as heating and cooling coils, filter sections, access doors, etc., shall be blanked and/or sealed to eliminate excessive bypass or leakage of air.
   e) All fans (supply, return, relief and exhaust) operating and verified for freedom from vibration, proper fan rotation and belt tension; heater elements to be of proper size and rating; record of motor amperage and voltage and verify they do not exceed nameplate ratings; and clean filters installed.
   f) As a part of this project contract, the installing Contractors shall make any changes in the sheaves, belts, and drives and dampers as required by the Balancing Contractor to obtain performance, at no additional cost to the Owner.

3. Water Circulating Systems
   a) Water systems shall be cleaned by circulation and strainers cleaned for normal operation.
   b) Check each pump motor amperage and voltage to insure readings do not exceed nameplate rating.
   c) Verify electrical heater elements to be of proper size and ratings.
   d) All water circulating systems shall be full and free of air; expansion tanks set for proper water level and/or air pressure; all air vents installed at high points of systems and operating.
   e) Check and set operating temperatures of heat exchangers to design requirements.
4. Automatic Controls:
   a) Verify that each control component is installed in accordance with project requirements and functional, including all electrical interlocks, damper sequences air and water resets, fire and freeze stats.
   b) The General Contractor, the Mechanical Contractor, and the suppliers of the equipment installed shall each cooperate with the Balancing Contractor to provide all necessary data on the design and proper application of the system components and shall furnish all labor and material required to eliminate any deficiencies or malperformance.
   c) The drawings and specifications indicate valves, dampers, and miscellaneous adjustment devices for the purpose of adjustment to obtain optimum operating conditions, and it will be the responsibility of the Mechanical Contractor to install these devices in a manner that will leave them accessible and readily adjustable. The Balancing Contractor will be consulted if there is a questionable arrangement of a control or adjustable device.
   d) During the balancing the temperature regulation shall be adjusted for proper relationship between controlling instruments and calibrated by the Control Subcontractor using data submitted by the Balancing Contractor. The correctness of the final setting shall be proved by taking hourly readings for a period of three successive eight hour days, in a typical room on each separately controlled zone. The total variation shall not exceed 2 degrees from the preset medium temperature during the entire temperature survey period.
   e) In each fan system, the air quantities shown on the plans may be varied as required to secure a maximum temperature variation of 2 degrees within each separately controlled space, but the total air quantity indicated for each zone must be obtained. The Mechanical Contractor shall be responsible for furnishing or revising fan drives and/or motors as necessary, without cost to the Owner, to attain the specified air volumes.
   f) The Mechanical Contractor shall assist the Balancing Contractor in performing three inspections within 90 days after occupancy of the building to ensure that satisfactory conditions are being maintained throughout and to satisfy any unusual conditions.
   g) The Mechanical Contractor shall assist the Balancing Contractor in performing inspections in the building during the opposite season from that in which the initial adjustments were made and at that time make any necessary modifications to the initial adjustments required to produce optimum operation of the systemic components, to produce the proper conditions in each conditioned space.
   h) In order that each system may be properly tested, balanced and adjusted as required herein by these specifications, the Mechanical Contractor shall

operate the systems for the length of time necessary to properly verify their completion and readiness for balancing, testing, and adjusting and shall further operate the systems during the balancing, testing, and adjusting period.

i) The schedule for balancing, testing and adjusting the HVAC systems shall be established by the Contractor in coordination with the Balancing Contractor.

1.3 STANDARDS

A. The Balancing Contractor shall perform the services in accordance with the Associated Air Balance Council's (A.A.B.C.) or N.E.B.B. standards and procedures including revisions to the date of the contract. The balance report shall be in the form of a standard N.E.B.B. Report Form or approved equal format. As a courtesy to the Balancing Contractor, the Engineer will review the proposed report format prior to the balancing procedure.

1.4 STORAGE

A. The Contractor shall provide the Balancing Contractor an area of ample size, conveniently located for storage of tools, equipment and other items as required.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 RESPONSIBILITY OF BALANCING (HVAC) CONTRACTOR

A. The services of balancing, testing, and adjusting of the heating, ventilating, and air conditioning systems will be performed by an independent technical firm or balancing company with a minimum of five years specialized experience in the field of air and hydronic system balancing, and possessing calibrated instruments, qualified Engineers, and skilled technicians to perform all required tests. Contractor shall be a qualified and certified member of Associated Air Balance Council (A.A.B.C.) or National Environmental Balancing Bureau (N.E.B.B.).

B. The tests shall demonstrate the specified capacities and operation of all equipment and materials comprising the systems. Such tests shall be made as are deemed necessary by the Engineer. Contractor shall then make available to the Engineer such instruments and technicians as are required for spot checks of the system.

C. The Balancing Contractor will not instruct or direct the Contractor in any of the work. Any proposed changes or revisions in the work shall be submitted to the Engineer in writing. The Engineer will forward any proposed changes to the Engineer for review and approval.

3.2 BALANCING SERVICES

A. The Balancing Contractor will inspect the installation of HVAC pipe systems, sheet metal work, temperature controls and other component parts of the heating, air conditioning, and

ventilating systems. The inspection of the work will cover that part relating to proper arrangement and adequate provisions for the testing and balancing. The inspections shall be performed periodically as the work progresses.

B. Upon completion of the installation and start-up of the mechanical equipment by the Mechanical Contractor, the Balancing Contractor will balance, test and adjust the systemic components to obtain optimum conditions in each conditioned space in the building.

C. The Balancing Contractor shall be responsible for inspecting, balancing, adjusting, testing, and logging the data on the performance of fans, each damper in the duct systems, each air distribution device or heat exchanger, and the flow of water through each coil.

D. The Balancing Contractor will, fourteen (14) days prior to final site observation, as requested by the Contractor, prepare and submit seven (7) copies of the completed Test and Balance Report. The Report shall be complete with logs, data and records as required herein and all logs, data, and records shall be typed, produced on white bond paper, and bound. The Report shall be certified accurate and complete by a Principal Engineer of the Balancing Contractor. The Engineer will, in coordination with the Engineer, review and approve the report.

E. General Procedure:
1. The Balancing Contractor shall perform a complete balance and test of heating, ventilating and air conditioning systems, including air moving equipment, air distribution exhaust systems, condenser water systems as herein specified. Each instrument used shall be accurately calibrated and maintained in good working order.
2. Balancing and testing shall not begin until the system has been completed and is in full working order. Mechanical Contractor shall put each heating, ventilating and air conditioning system and equipment into full operation and shall continue the operation of same during each working day of testing and balancing.
3. Provide services for both normal and emergency backup systems.
4. Upon completion of the air conditioning system, Balancing Contractor shall perform the following tests, compile the test data, and submit completed test data to Engineer for forwarding to Engineer for evaluation and approval.

F. Air Balancing Procedure:
1. The Balancing Contractor shall perform the following tests and balance the system in accordance with the following requirements:
    a) Test and adjust blower speed and rotation to design requirements.
    b) Make fan speed adjustment with variable pitch sheave. When proper speed is achieved, Mechanical Contractor shall replace variable sheave with proper fixed pitch sheave.
    c) Test and record motor full load amperes.
    d) Make pitot tubes traverse of main supply and obtain design cfm at fans.
    e) Test and record system static pressures, suction, and discharge.
    f) Test and adjust system for design cfm recirculated air.
    g) Test and adjust system for design cfm outside air.
    h) Test and record entering air temperatures (db for heating and db/wb for cooling).
    i) Test and record leaving air temperatures (db for heating and db/wb for cooling).
    j) Adjust each zone to proper design, cfm, supply and return.
    k) In cooperation with the control manufacturer's representative, set adjustments of automatically operated dampers to operate as specified, indicated and/or noted.

l) Test and adjust the differential pressure requirements for rooms that are stated with specific requirements such as isolation rooms
m) Test and aid in calibration of room pressure controls to verify these are operating properly and are in accordance with the actual field readings.

G. Water Balancing Procedure:
1. Preparation of System: The Mechanical Contractor shall prepare the water systems for balancing in the following manner:
a) Open all valves to full position, including coil stop valves, close bypass valves, and return line balancing cocks.
b) Remove and clean each strainer.
c) Examine water in system to determine if it has been treated and is clean.
d) Check expansion tanks to make sure they are air charged and that the system is full of water.
e) Check each air vent at high points of water systems to make sure they are installed properly and are operating freely. Make certain all air is removed from circulating system.
f) Complete air balance must have been accomplished before water balance is begun.
2. Water Balancing Procedure (By Balancing Contractor)
a) Set pumps to proper flow and head.
b) Check leaving water temperatures, return water temperatures and pressure drop through heat exchangers. Reset to correct design temperatures.
c) Check water temperature at inlet side of coils. Note rise or drop of temperature from source.
d) Balance each heat exchanger. Upon completion of flow readings and coil adjustments, mark all settings and record all data.
3. Full Flow Rebalance Procedure
a) After making adjustments to heat exchangers, recheck settings at pumps and equipment. Readjust if required.
b) Install pressure gauges on each coil, then read pressure drop through coil at set flow rate on call for flow.
4. Check and record the following items at each cooling and heating unit:
a) Entering and leaving water temperatures.
b) Pressure drop.
c) Rated and actual running amperage of each pump motor.

H. Adjustments
1. All equipment shall be adjusted so that it will perform as specified and shown.
2. Readjustment, where necessary to accomplish the specified results, shall be made during the guarantee period at no additional cost to the Owner.
3. Temperature Control Contractor shall make all adjustments to temperature control system.
4. Mechanical Contractor shall make any changes in the pulleys, belts, and dampers or add any dampers, as required for correct balance, as required at no additional cost to Owner.

I. Instrumentation: Balancing Contractor must provide all necessary instruments to complete balancing and testing work, including the following instruments for field use:
1. One set of pressure gauges and fittings.
2. Dry bulb thermometer.
3. Wet bulb thermometer.
4. Thermocouple unit and thermocouples.
5. Set of balancing cock adjustment wrenches.

6. Portable field flowmeter.

J. The Balancing Contractor shall:
   1. Provide for adequate services to make follow up measurements and adjustments as deemed appropriate by the Contracting Officer at the advice of the Engineer.
   2. Perform three inspections within 90 days after occupancy of the building to ensure that satisfactory conditions are being maintained throughout and to satisfy any unusual conditions. Advise Owner's representative of proposed inspection 15 days prior to scheduled inspection.
   3. Perform inspections in the building during the opposite season from that in which the initial adjustments were made and at that time make any necessary modifications to the initial adjustments required to produce optimum operation of the systemic components, to produce the proper conditions in each conditioned space. Advise Owner's representative of proposed inspection 15 days prior to scheduled inspection.

END OF SECTION

SECTION 23 07 00

HVAC INSULATION

PART 1 – GENERAL

1.1 SCOPE

A. Furnish all labor and materials necessary for the complete installation of thermal insulation on all hot and cold surfaces which require insulation for heat or cold conservation, comfort and safety of occupants, efficiency or ease or operation, or to prevent condensation or dripping. The insulation shall be complete and effective throughout the building.

B. Section Includes:
1. Ductwork insulation.
2. Piping insulation
3. Insulation accessories including vapor retarders and accessories.

C. All work shall be performed in a neat and professional manner by a Contractor or Subcontractor regularly engaged in the insulation field. The Mechanical Contractor shall be responsible for the bidding and execution of this work.

D. Any equipment or devices mentioned specifically in this section or any equipment or devices installed by the Mechanical Contractor that can have or cause temperatures low enough to cause condensation shall be adequately insulated and vapor sealed. If equipment, devices, or required insulation product is not specifically mentioned in this section or shown on drawings, the Contractor is required to request and obtain written instructions from the Engineer. If condensation should occur due to inadequate or missing insulation and/or vapor sealing, such damage, including damage to other affected property or building elements, shall be repaired by Contractor at no cost to the Owner.

1.2 GENERAL REQUIREMENTS

A. All insulation inside the building shall have composite (insulation, jacket or facing, and adhesive or cement used to adhere the jacket to the insulation) flame-spread rating of 25 or less and smoke-developed rating of 50 or less as tested under procedure ASTM E-84 and NFPA 255.
1. Insulation with a less stringent flame and smoke rating may be used only with the written permission of the Engineer.
2. Insulation products that meet the 25/50 rating requirement but that melt and drip flammable products, such as closed cell polyethylene products, are not acceptable.

B. Accessories such as adhesive, mastics, cements, and cloth for fittings shall be permanently fire and smoke resistant. Chemicals used for treating paper in jacket laminates shall be unaffected by water or humidity.

C. All adhesives, sealers, vapor barrier coatings, etc., shall be compatible with materials to which they are applied and shall not corrode, soften, or attack such materials in either the wet or dry state. Unless otherwise approved, all adhesives, sealers, coatings, mastics, etc., shall be water based.

D. Any insulation product found to be damaged or has become wet, whether installed or stored, shall be immediately removed and replaced with new product.

E. Thermal insulation shall be applied where needed, including but not limited to the following systems, as described herein:

1. Ductwork,
2. Chilled water piping
3. Refrigerant piping
4. Grease Duct

PART 2 - PRODUCTS

2.1 DUCT WORK INSULATION

A. Air Conditioning Duct

1. Indoors: Insulation shall be foil faced 2" thick duct wrap, 1.0 lb/cu.ft. density, R-5 (installed) and a foil-skrim-kraft composite vapor barrier. Insulation shall be CertainTeed Standard Duct Insulation, Knauf Duct Wrap, Owens-Corning Fiberglas, Manville R-Series Microlite, or approved equivalent.
2. Outdoors: 2-1/2” thick, 3.0 lb/cu.ft., FSK vapor barrier, R-8 (installed). Provide a 0.016 thick aluminum with longitudinal z-joint similar to J-M "metal-lok". Secure with holding band or with screws 4 inches on center. Apply aluminum jacket continuously at all fittings.
3. Duct liner: Where indicated on the drawings, provide listed duct liner of the thickness and density as described on the drawings. Liner shall have anti-microbial facing and be glued and pinned on 18 inch centers.

B. Grease Duct (Thermal Ceramics)

1. APPLICATIONS/SCOPE

a) 1 and 2 Hour; zero clearance Applied Fire Protection for Commercial Kitchen Grease Ducts when tested in accordance with ÅSTM E 2336. Reference ICC-ES Building Code Report ESR 2213 or ESR 2832, also reference UL Listing HNKT G-18.

b) 1 and 2 Hour Applied Fire Protection when tested in accordance with UL 1978; Compliant per Intertek Listing TC/BI 120-01.

c) 1 and 2 Hour F- and T-Rated Through Penetration Firestop when tested in accordance with ASTM E 814 (UL 1479): UL Through Penetration listings; C-AJ-7012; C-AJ-7014; C-AJ-7035; C-AJ-7047; C-AJ-7095; C-AJ-7098; F-C-7036; F-C-7037; F-C-7055; W-L-7041; W-L-7099; W-L-7121; W-L-7145; W-L-7158; W-J-7086. See UL Online Fire Resistance Directory at www.ul.com for current listings.

d) 1 and 2 Hour Applied Fire Protection for Ventilation Air Duct when tested in accordance with ISO 6944-1985 - Reference UL Listings HNLJ V2 (for 3-hour); HNLJ V19 (for 2-hour); HNLJ V29 (for 1-hour on dryer vent).

2. MATERIAL

a) Thermal Material: 2192 F degree rated core blanket, manufactured from patented bio-soluble Superwool chemistry (Calcium Magnesium Silicate).
   (1) Product: FireMaster FastWrap XL or Pyroscat Duct Wrap XL as manufactured by Thermal Ceramics.
   (2) Fully encapsulated thermal material in fiberglass reinforced aluminum/polypropylene scrim (FSP).
      (a) Encapsulation FSP marked with UL Classification Mark.
      (b) Encapsulation FSP marked with ICC-ES report number

ESR 2213 or ESR 2832.

(c) Collars supplied in 6 inch (150 mm) wide by 25 feet (7620 mm) long rolls.

b) Product Characteristics:
(1) Thickness: 1-1/2 inch (38 mm).
(2) Nominal Density: 6 pcf.
(3) R-Value: 7.35 per layer of FireMaster FastWrap XL or Pyroscat Duct Wrap XL when tested in accordance with ASTM C 518 at 75 F.
(4) Flame Spread: <25 when tested in accordance with ASTM E 84.
(5) Smoke Development: <50 when tested in accordance with ÅSTM E 84.

3. ACCESSORY MATERIALS:

a) Glass Filament Tape: Minimum 3/4 inch (19 mm) wide - used to temporarily secure blanket until permanent attachment using steel banding and/or steel insulation pins.

b) Aluminum Foil Tape: Minimum 3 inches (76 mm) used to seal cut edges.

c) Carbon Steel or Stainless Strapping Material Minimum: 1/2 inch (13 mm) wide and 0.015 inch (.38 mm) thick

d) Steel Insulation Pins: Minimum 12 gage, length sufficient to penetrate through duct wrap insulation.

e) Insulation Clips: Galvanized steel, minimum 1-1/2 inches (38 mm) round or square.

f) Through Penetration Firestop Sealants:
(1) Packing Material: Remove encapsulation material from FireMaster FastWrap XL or Pyroscat Duct Wrap XL, use core blanket (white) as penetration packing material.
(2) Firestop sealants per applicable building code report and/or laboratory design listings.

g) Grease and HVAC Duct Access Doors:
(1) Thermal Ceramics FastDoor XL Access doors; Supplied in standard door sizes of 6 by 10 inches, 8 by 12 inches, 12 by 12 inches, 12 by16 inches, and 20 by 20 inches.

2.2 PIPING

A. Chilled Water

1. Insulation not in Return Air Plenum: Provide closed cell, premolded, polyisocyanurate pipe insulation at scheduled PI thickness. Product shall have a maximum aged k-factor of 0.19 Btu-in/hr-s.f.-deg F after 180 days, a compressive strength of 24 lb/s.i., water absorption after 96 hours of immersion of 2% by volume and 0.04 lb/s.f., water vapor permeability of 4 perm-inch, maximum flame spread rating of 25 for 1” through 6” thickness, and a maximum smoke developed rating of 55 through 1-1/2” thickness. Provide insulation with factory applied vapor retarder jacket and tape.

2. Insulation in Return Air Plenum: Phenolic Foam insulation shall be used at scheduled PF thickness. Conductivity of 0.13 Btu in./hr/sf/deg F. at mean temperature of 75 degrees F and 0.17 at 150 degrees F. Jacket and sealing method same as above. Product shall be Kingspan Koolphen K, Resolco Insul-Phen, or approved equivalent.
3. Fittings, including but not limited to, short and long radius ells, tees, reducers, traps, valves, (except HVAC control valve) shall be insulated with factory made, one-piece, pre-molded high impact PVC covers with pre-cut insulation inserts. Acceptable products are Snap*Form by Certainteed, Knauf Fitting Cover System, Zeston 2000 by Manville, or approved equivalent.
4. Piping Exposed to Weather and Piping Exposed Inside of the Building: Provide jacket of 0.016 thick aluminum with longitudinal z-joint similar to J-M "metal-lok". Secure with holding band. On pipe sizes 6 inches and above, aluminum jacket may be secured in place with screws 4 inches on center. Apply aluminum jacket continuously at all fittings including ells, tees, reducers, etc..
5. Thickness

Piping Indoors

Service	Pipe Size	Min. Thickness PI	PF	
Chilled HVAC Water	1" & smaller		1 inch	3/4inch
	1-1/4"& up		1-1/2	1inch

6. Piping exposed to ambient and conveying water shall have minimum 2-1/2 inch thick insulation.

B. HVAC Refrigerant Piping

1. Insulation shall be one piece molded tubular EDPM Insulation, ASTM C534 Type I and II. The insulation shall be sized by the manufacturer and correctly provided and installed by the Contractor to fit both the nominal pipe size and also the pipe material. Thermal conductivity shall be no greater than 0.245 BTU in./hr/sq. ft./deg. F at a mean temperature of 75 degrees F. Product shall be Aerocell or approved equivalent.
2. Provide adhesive compatible with insulation product.
3. Piping Exposed to Weather and Piping Exposed Inside of the Building: Provide jacket of 0.016 thick aluminum with longitudinal z-joint similar to J-M "metal-lok". Secure with holding band. On pipe sizes 6 inches and above, aluminum jacket may be secured in place with screws 4 inches on center. Apply aluminum jacket continuously at all fittings including ells, tees, reducers, etc..
4. Thickness

Piping Indoors

Service	Pipe Size	Min. Thickness
Liquid Line	all sizes	½ inch
Vapor Line	up to 1-1/8”	¾ inch
Vapor Line	1-1/4” and above	1 inch

PART 3 - EXECUTION

3.1 DUCTWORK EXTERNAL INSULATION

A. Applications:
   1. Insulate and vapor seal the following ductwork:
      a) air conditioning supply air ductwork,
      b) air conditioning supply air ductwork that is concealed or located in mechanical rooms,
      c) outside air duct from exterior intake louvers to the air handler rooms,
      d) air conditioning return and exhaust in non-plenum areas,
      e) exposed ends of heating water coils at reheat type air terminal boxes to prevent end of coil from sweating,
   2. The following ductwork does not require insulation:
      a) exhaust air ductwork unless noted,
      b) return air ductwork unless noted.

B. Air Conditioning Duct
   1. Before applying duct wrap, sheetmetal duct shall be clean, dry and tightly sealed at all joints and seams.
   2. Prepare overlap by removing approximately 2 inches of insulation from facing. Wrap insulation around duct with facing to the outside so the 2-inch flap completely overlaps facing and insulation at the other end of stretch out. Insulation shall be snugly butted.
   3. Seams shall be stapled approximately 6 inches on center with outward clinching staples, then sealed with 4-inch wide pressure-sensitive tape matching the facing and designed for use with duct insulation. Tape shall be Hardcast Foil-Grip 1402 or approved equivalent.
   4. Adjacent sections of duct wrap insulation shall be snugly butted with the circumferential 2-inch tape flap overlapping and secured as recommended for longitudinal seam. In lieu of pressure-sensitive tape, two coats of vapor retarder mastic reinforced with one layer of 4-inch wide open weave glass fabric may be used.
   5. The insulation on the underside of duct work 24 inches or greater shall be secured with mechanical fasteners and speed clips spaced approximately 18 inches 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.
   6. Wherever an externally insulated duct rests on a trapeze hanger, remove a strip of the external flexible wrap and install a high density rigid insulating board such as calcium silicate, foamglass, or approved equivalent between the duct and the hanger. Rigid insulation shall be at least twice the width of the hanger and shall be full width of the duct. Repair the insulation facing to provide a continuous vapor barrier.
   7. Vapor barrier shall be complete and unbroken.

C. Kitchen Exhaust Grease Duct
   1. Apply in strict accordance with manufacturer’s recommendations and product listing.

3.2 PIPING INSULATION INSTALLATION

A. General
   1. All insulation shall be continuous through wall and ceiling openings and sleeves. Insulation on all cold surfaces, where vapor barrier jackets are used must be applied with a continuous unbroken vapor seal. Hangers, supports, anchors, etc., that are secured directly to cold surfaces must be adequately insulated and vapor sealed to prevent condensation. Where insulation is discontinued, special care shall be taken to taper the insulation to the pipe to allow for vapor barrier to completely seal off end of the insulation.

2. Insulation shall be applied after the surfaces have been thoroughly cleaned and dry and all piping has been tested and proven tight.
3. Circumferential self-sealing strips shall be applied to all butt joints to form a positive closure.
4. On all premolded fiberglass insulation with self-sealing adhesive strips, Contractor shall apply outward clenching staples along the longitudinal strip, on 12 inch centers. Contractor shall additionally apply a mastic along the entire longitudinal strip, taking care to completely cover and seal the staples, and along the circumferential strip at butt joints, completely covering the adhesive strip and at least 3/4 inch on each side of the strip. Mastic shall be Hardcast "Flex-Grip", Rectorseal "Air Lock", or approved equivalent.

B. Supports

1. Metal shields shall be applied between hangers or supports and all types of pipe insulation. Shields shall be formed to fit the insulation and shall extend minimum up to the center line of the pipe. A full coat of insulating sealer shall be applied to the surface of the insulation in contact with the metal shield. The metal shields shall conform to the following chart:

Pipe Size	Metal Ga.	Length of Shield
½” to 3"	20 ga.	12"
4” and up	16 ga.	16"

2. On pipes sizes 1-1/2 inches and larger, Contractor shall provide and install at each support, a high density insulation insert to carry the weight of the pipe. Insert shall be premolded to fit the pipe size, shall cover the bottom half of the pipe, and shall be one inch longer at each end than the sheetmetal shield. For pipes that are not susceptible to condensation such as heating water pipes, domestic hot water pipes, etc., the high density insulation insert material shall be calcium silicate, perlite, urethane, or cellular glass. On pipes that are susceptible to condensation such as chilled water pipes, domestic cold water pipes, etc., the high density insulation material shall be urethane or cellular glass.

C. Fittings

1. On pipes carrying warm or hot liquids, the fitting covers may be secured with tacks or snaps with the butt joints taped at the pipe insulation. On pipes carrying cold liquids, the fitting covers shall receive a vapor barrier sealant similar to that in "Pipes" above.

D. Valves

1. Valves installed in lines carrying cold liquids, i.e. chilled HVAC water, chilled drinking water, or any other liquid of sufficiently low temperature as to cause condensation on the valve body surface, shall have the valve body insulated and vapor sealed up to the bottom of the operating device (handle, wheel, etc.).
2. Valves installed in lines carrying hot liquids, e.g. heating water, domestic hot water, etc., shall be similarly insulated but not vapor sealed.
3. All valves provided and installed by others that are installed in pipe to receive insulation are to have provisions to accommodate the insulation. If the Insulation Contractor encounters a valve that does not have adequate provision to accommodate the insulation without reduction in thickness and without compressing the insulation, then it is the responsibility of the Insulation Contractor not to try to insulate the valve body and to inform the General Contractor immediately so that corrective action may be initiated.
4. Exposed stop valves for plumbing fixtures are excluded.

E. Cold Condensate Drain Lines

1. Insulate and continuously vapor seal each cold condensate drain and drain line from the point where it attaches to a fan-coil unit, air handler, or other device until it discharges into a floor drain, hub drain, or other device. The insulation and vapor seal shall run continuously around any P-trap.

F. Elastomeric Insulation
1. Fittings including, but not limited to, ells, tees, caps, reducers, and valves, shall be adequately insulated and vapor sealed (where required) by using miter-cut tubing or the same insulation in a sheet form.
2. In all cases, all butt joints and seams are to be completely sealed with a contact adhesive manufactured and provided by the insulation manufacturer, such as Armstrong 520 Adhesive.
3. Insulation installed outdoors shall have applied two coats of weather-resistant protective finish, Armstrong Armaflex Finish or approved equivalent. The protective finish shall cover 100% of the insulation exposed to the outdoors.

END OF SECTION

SECTION 23 09 23

TEMPERATURE CONTROLS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This work shall include the provision and installation of a complete and working temperature control (TC) system and building management system (BMS) for an expansion of an existing facility. The work shall be completely compatible and seamlessly integrated with the existing Automated Logic system and shall include any modifications to the existing system hardware and software including graphics.

B. This system shall be of the Direct Digital Control (DDC) type with electrical and electronic devices and actuators.

C. This Section is part of the entire set of Construction Documents of the Project including the other Sections of these Specifications, the Drawings, all Addenda and other related documents.

D. It is intended that the completed controls system be fully seamless and compatible with the existing Automated Logic systems at the facility.

E. The contractor is encouraged to utilize the latest and best technology available to achieve the described results.

1.2 SCOPE

A. System
1. This Section describes specific requirements, products, and methods of execution related to the system of temperature controls and instrumentation for the project.
2. Controls Contractor shall prepare drawings indicating input/output summary, flow diagrams, and sequences of operation necessary to work as required for coordination with other contractors.
3. Work to include a complete automatic temperature control system including any and all control devices, 120 volt (not provided by electrical contractor) and low voltage wiring and conduit, DDC controls, valves, dampers, relays, control modules, sensing devices, switches, and instrumentation necessary to obtain all functions and sequences hereinafter specified. Verify with Electrical Contractor on location where 120 volt power may be obtained.

B. System Requirements:
1. All material and equipment used shall be standard components, regularly manufactured and available and not custom designed especially for this project. All systems and components, except site specific software, shall have previously been thoroughly tested and proven in actual use prior to installation on this project.
2. The system architecture shall be fully modular permitting expansion of application software, system peripherals, and field hardware.

C. SPECIAL NOTES:
1. All provisions and divisions of these Specifications are a part of this Section of the Specifications. The Contractor shall consult these divisions and provisions in detail for instructions and include all items pertaining to this work. The Contractor shall consult all other divisions of these Specifications,

determine the extent of impact on the work required to complete the work required by this Section of the Specifications or portion thereof and related work shown on the drawings.

2. The contractor may utilize equipment provided controllers if compatible with the basic proposed control system. It is the control contractor's responsibility to verify the compatibility and suitability of the systems and components and its seamless integration into the BAS to achieve the prescribed sequences, monitoring and control points described in the I/O summaries and as specified herein.
3. It is the control contractor's responsibility to integrate any and all equipment provided points and controllers with the BAS to result in a complete and working system.

1.3 SUBMITTALS

A. Data Sheets for all control systems and components.
B. Submit detailed sequence of operation for new system including set points of new work.
C. For the complete system, submit control system drawings containing pertinent data to provide a functional operating system, including a written sequence of operation easily recognized as that specified. Submit detailed shop drawings in record drawing form upon project completion. Show each system complete on one drawing.
D. An operator's manual which will include detailed instructions for all operations.
E. An operator's reference table listing the addresses of all connected input points, output points and unguarded software parameters. Settings shall be shown where applicable.
F. Submit specification sheets documenting the presence in each DDC controller of all specified control modes and energy management programs listed under the DDC controller specification. This software shall be resident in each controller for future use even if not applied in the sequence of operation.
G. Provide diagrams and descriptive sequence of operation for each software program proposed to be used on the project as part of the submittal process. Revisions made as a result of the submittal process, during the installation, start-up or acceptance portion of the project, shall be accurately reflected in the 'as-built diagrams herein required by this Specification.

1.4 PROJECT SPECIFIC MANUALS

A. Reference manuals for the system shall include the following categories: User's Manual, Engineering Handbook, and Software documentation. Project specific manuals shall include detailed information describing the specific installation.
   1. User's Manual:
      a. System reference material shall contain as a minimum, an overview of the system, its organization, the concepts of networking and central site/field hardware relationships as well as the following:
         (1) Activating the central site
         (2) Central site screen menus and their definitions
         (3) Establishing setpoints and schedule
         (4) Uploading and downloading software, setpoints, schedules, operating parameters and status between the central site and field hardware.
         (5) Collecting trend data and generating trend plots
         (6) Enabling alarms and messages
         (7) Report generation
         (8) Backing up software and data files

(9) Network communications

2. Engineering Manual:
   a. Include detailed information on:
      (1) Hardware - cut sheets and product descriptions
      (2) Engineering - design requirements for initial installations
      (3) Installation - mounting and connection details for field hardware, accessories and central site equipment
      (4) Field hardware set-up, checkout and tuning techniques
      (5) Central site set-up, software loading and checkout techniques
      (6) A listing of basic terminology, standard alarms and messages, error messages and frequently used commands
3. Software Documentation:
   a. Shall contain as a minimum, descriptions of the control software programs used in the system. Descriptions shall include:
      (1) Diagrams and listings showing maximum input/output point configurations for controlled equipment
      (2) A description of the control elements and sequences available for the equipment
      (3) A listing of the information which is displayed to the operator for each piece of controlled equipment
      (4) A listing of the alarm and message conditions which may be detected for each piece of controlled equipment and the standard alarm and message texts which can be displayed when those conditions exist
      (5) Diagrams for each software application program provided as a part of this project

1.5 ADJUSTMENT

A. Upon completion of the project, adjust and validate all sensors, controllers, damper operators, relays, etc., provided under this Section. Place controls in proper operating order while working in close coordination with the Balancing and Testing Agency and then demonstrate to the satisfaction of the Engineer that all of the control systems perform the sequences specified and are functioning in perfect operating order.

1.6 WARRANTY

A. Upon receipt of the certificate of substantial completion, a warranty period of one year commences. The warranty consists of providing, at no additional cost to the Owner, parts and labor as required to repair or replace such parts of the temperature control system that prove inoperative or faulty due to defective materials, control system design, or installation practices. This warranty excludes routine service.
B. Upon completion of the installation the Contractor shall inspect, check, regulate, and adjust the control system and certify that they are installed in accordance with "record drawings."
C. Factory trained full time employees of the Controls manufacturer shall provide all installation, engineering, maintenance and warranty work and shall respond within four hours of notification during normal working hours.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Automated Logic – basis of design.
B. Pre-approved equivalent manufacturers.

2.2 GENERAL

A. Provide a direct digital electronic automatic temperature control system. The system shall consist of direct digital control (DDC) systems for the HVAC systems and shall incorporate all equipment necessary to provide the sequence of operation hereinafter specified and as shown on the plans. All digital equipment shall be designed to provide protection against interference by external voltages when operated in a commercial environment. All literature shall so note, and all equipment shall be so labeled to show this compliance. This system shall use electronic temperature sensors, interfaced through stand alone DDC controllers and unitary controllers. The stand alone DDC controllers shall be configured so that a portable operator's terminal may be plugged in to monitor and adjust any or all unitary controllers.

B. All temperature control devices shall be standard catalog products and shall essentially duplicate equipment which has been in satisfactory service for at least 3 years. A minimum of 90% of the control equipment shall be manufactured by the installing manufacturer. The equipment guarantee on all equipment shall be by the installing manufacturer.

2.3 DAMPERS

A. Standards: Provide opposed blade and parallel blade factory fabricated dampers of extruded aluminum galvanized steel or stainless steel with metallic anti-friction non-ferrous bearing in accordance with Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) standards.

B. Operators: Damper operators shall have sufficient power to open and close the dampers and limit the leakage to the specified rate.

C. Shafts and Bearings: Provide cadmium plated steel shafts in permanently lubricated bronze sleeve bearings or permanently lubricated ball bearings.

2.4 ACTUATORS

A. General: Provide electric motor driven actuators (operators) arranged "Fail Safe" in the event of power failure. Design operators to be quiet in operation and function within a range 85 to 100 percent input power potential.

B. Electric Actuators: Provide hydraulic or gear type electric actuators.
   1. When operated at rated voltage each actuator shall deliver the torque required for continuous uniform movement of the control device from limit to limit
   2. Provide an end switch to limit travel and design the actuator to continuously stroke without damage.
   3. Operators shall function properly within a range of 85 to 120 percent of line voltage. For actuators with input power greater than 100 watts, gears shall be ground steel, oil immersed, shaft shall be hardened steel running in bronze, copper alloy or ball bearing and operator and gear trains shall be totally enclosed in dustproof cast iron, cast steel or cast aluminum housing.
   4. Actuators with input power less than 100 watts may use fiber or reinforced nylon gears with steel shaft, copper alloy or nylon bearings and pressed steel enclosures
   5. Two position actuators shall be of the single direction, spring return or reversing type.
   6. Proportioning operators shall be capable of stopping at all points in the cycle and starting in either direction from any point

7. Reversing and proportioning operators shall have limit switches to limit travel in either direction.
8. For actuators with greater than 400 watts input, provide totally enclosed reversible induction motors with auxiliary hand crank and permanently lubricated bearing.

2.5 USER INPUT/OUTPUT TERMINAL EQUIPMENT

A. The direct digital control (DDC) system shall consist of stand alone DDC controllers and input/output boards at each unit. The manufacturer shall have standard existing software to facilitate the direct interface of this DDC system with an industry standard CPU, color display and printer located at the maintenance office.

B. Provide and install at least 4 complete sets of software for installation on Owner supplied computers. Provide connections to the DDC system from each of the hardware systems supplied by the Owner.

C. The computer terminals shall allow interface to all the DDC controllers in the facility. From any terminal the operator shall be able to view and change all input and output values that are reported on any DDC controller within the facility.

D. Provide all software and hardware to enable communications via industry standard modem.

2.6 DIRECT DIGITAL CONTROLS

A. DDC Controller:
   1. Direct digital controllers shall be microprocessor-based with all hardware, software, and operator/programmer terminals. Systems shall be capable of stand-alone operation, multiple controller operation with common operator terminals, and/or incorporation into larger systems.
   2. System to include DDC controllers, and operator's/programmer's terminal. The controllers shall be mounted and wired in a factory enclosures complete with all relays, digital to analog converters, power supplies and terminal strips when located outside the unit enclosure. The controller to operate within the following limits:
      a. Temperature: 0 to 130^{o} F
      b. Humidity: 0 to 95% RH (non-condensing)
   3. All DDC algorithms and parameters shall be RAM based for ready access for modification and adjustment. Memory provided shall be configured and non-volatile.
   4. The Controller Software shall include a complete operating system, standard energy management application packages, standard control algorithm application packages, and an owner/used custom control and calculation application package and graphic function blocks.

B. The operating system software shall operate independently of any central computer. The operating system shall control communications between the operator's terminal and the controllers and I/O modules, provide alarm monitoring and reporting, provide control application packages, interface a variety of sensor and actuator types, and contain built-in diagnostic routines. The controller to have memory error checking. Upon detection of a memory error, the CPU shall correct the error or halt to prevent erroneous operation. All "halts" shall report as an alarm at the control operator's terminal and remote.
   1. After a power failure, and upon a power restoration, the system shall provide automatic sequential restart of equipment based on current program time and program requirements.
   2. All modules shall communicate with equal authority on a peer-to-peer network. Each module is stand-alone.

2.7 CONTROLLER SOFTWARE PROGRAMS:

A. The software shall consist of discreet programs that can be implemented in any combination, in coordination with the proper control sequences, by providing the necessary input sensors and programming the required sequence, and executing proper commands to the output devices.
   1. Application Software: Application software shall establish sequences for individual control systems. Software shall be written locally by the supplier, incorporating all energy management software as well as all necessary subroutines to provide required sequences. The custom software shall allow the operator to read the stored data and to program custom control sequences directly into microcomputer memory, such as; change "start/stop" times, add or delete loads, change control strategy, etc.

B. Unitary Controller:
   1. Unit controllers shall support, but not be limited to, the following types of systems to address specific applications described in the "Execution" portion of this Specification, and for future expansion:
      a. Heat Recovery Unit
      b. Air Handling Unit
      c. Circulating Pumps
      d. Exhaust/Supply Fans
   2. Unitary controllers shall support the following types of point inputs and outputs:
      a. Outdoor Air Switch over Inputs:
         (1) Dry bulb
         (2) Outdoor Air Enthalpy
         (3) Differential Temperature
         (4) Binary Input from a separate controller
      b. Outdoor Air Outputs:
         (1) Integrated analog with minimum position
         (2) Binary output to enable self-contained economizer actuator
      c. Heating and Cooling Outputs:
         (1) to 3 stages
         (2) Analog output with two-pipe logic
         (3) Reversing valve logic for heat pumps
      d. Fan Output:
         (1) On/off logic control
   3. Unitary controllers shall support the following library of control strategies to address the requirements of the sequences described in the "Execution" portion of this Specification, and for future expansion:
      a. Daily Schedules
      b. Comfort/Occupancy Mode
      c. Economy Mode:
         (1) Standby Mode
         (2) Unoccupied
         (3) Shutdown
      d. Temporary Override Mode:
         (1) Temporary Comfort Mode (Occupancy-based control)
   4. Temporary Override Modes:
      a. Temporary Occupancy Mode: The controller interface to the zone temperature sensor shall allow for an optional momentary switch to change the mode of the controller from economy to comfort.
   5. Alarm Management: Each unitary controller shall perform its own limit and status monitoring and analysis to maximize network performance by reducing unnecessary communications.

C. Points:

1. All points shall be adjustable from unitary controller terminal, portable operator terminal, laptop or main computer.

D. Network Control Unit
   1. Building Master Controller
   2. The Network Control Unit (NCU) shall establish a local area communications network within the facility to support communications to all DDC controllers located in the building. The NCU shall also provide a minimum of three communications ports.
      a. A communications port shall be provided to enable the portable network terminal to plug in to communicate with all DDC controllers and all input/output values in the facility.
   3. An operator terminal port shall be provided with communications modem to facilitate dial out two way communications.

2.8 DDC Sensors:

A. Temperature sensors shall be thermistor or RTD based.
   1. Space Temperature Sensors shall both be installed in a wall mounted decorative enclosure. The sensor shall be provided with manufacturers standard locking cover with a "warmer-cooler" slider adjustment on the cover for changing the temperature setpoint. Provide with zone bus jack for zone terminal connection and built-in override switch.
   2. Provide insulated base behind all sensors located on any exterior walls.
   3. Outside air wall mounted sensors shall be provided with a sun shield.

B. Humidity Sensor – Thin film polymer capacitive type, 5% to 95% RH, direct proportional analog output, ±3% RH for 10% to 90% RH.
   1. Room Sensor – Match thermostat cover, local adjustable setpoint, digital readout.
   2. Duct Sensor – Set at 90% for humidifier override, digital readout

C. Differential Pressure Switches shall be used for filter alarm indication on the heat recovery units and major air handling units only. Switches shall be UL listed adjustable set point and differential pressure type. Switches shall be piped to respond to pressure differential between inlet and outlet sides of the filters.

D. Current sensing relays shall be used for indication of on/off status of electrical devices such as fans, compressors, valves and VFD's. Provide fixed response relays that are selected to respond to the applicable current or provide adjustable relays that can be adjusted to the appropriate current.

E. Static pressure sensor shall be large diameter diaphragm type mounted in the air handler control panel with 3/8” tubing extended to the remote sensing location described in the Sequence of Operation.

PART 3 - EXECUTION

3.1 COORDINATION

A. Coordinate this work with the work of other trades, and make arrangements for the complete and proper accomplishment of all related work.

3.2 ELECTRICAL WORK

A. All electrical installation work related to the temperature control system, including the electrical interlocks required to provide the control sequences specified herein and not specifically specified in Division 26 or shown on the electrical drawings shall be the responsibility of the control contractor. Electrical work performed under this Section shall

conform with all requirements of Division 26 of these Specifications with the following exceptions as to wire type and minimum size:
1. Interlock: #16 Ga, 600 volt THHN insulation.
2. Communication Bus: As recommended by the control manufacturer.
3. " DDC" Analog Sensors: As recommended by the control manufacturer.

B. All power control wiring and conduit to control cabinets and DDC equipment, operators, etc. shall be provided under this Division of the Specifications. Coordinate with Electrical Contractor for available space in panels as required. All wiring shall be concealed where ever possible.

C. Provide all exterior control wiring in rigid galvanized conduit. Provide EMT conduit in mechanical rooms, exterior walls, and any place that wiring is exposed in finished and normally occupied spaces. Provide EMT conduit in walls for wall mounted devices from junction box in wall to above ceiling line. Reference division 16 for conduit installation, fittings, support, etc.

D. Low voltage (less than 50 volts) open cable may be run in all other areas having accessible ceiling areas and/or above 10 ft. Where cable penetrates walls or floors provide appropriate sleeves. Install plenum rated cable if in return plenum. Support all cabling securely from structure. Use of wire or perforated strap for support is prohibited. Cabling laying on ceilings is prohibited.

3.3 INSTALLATION

A. Wiring: Provide wiring and conduit to connect the automatic control system components for an operational system.
1. Provide wiring in accordance with the NFPA 70 and Division 16 of these Specifications.
2. Do not bury or conceal wiring beneath insulation.
   a. Locate wiring clear of access doors, accessible ceilings, lighting fixtures, walkways, or any location subject to damage or abrasion.

B. Identification: Label or code each field wire at each end, and each controller and controlled device.
1. Identification shall be permanent, robust, not subject to fading, and flameproof.
2. Permanently mark terminal blocks at wire termination points.
3. Identify each control device with an engraved laminated phenolic nameplate, white on black, lettering not less than 1/8-inch height, on 1-1/2-inch by 1-inch tag and brass interlocked chain secured to the control device. Name shall correspond with identification on the shop drawings.
4. Identify sensors, controllers, relays, either mounted in local or central control panels, or remote mounted with a similar name tag as specified above. Attach to or adjacent to controllers with stainless steel or brass screws or rivets. Adhesives will not be acceptable. Do not attach to removable controller covers.

C. Pressure and Temperature Sensors: Install pressure and temperature sensors as follows.
1. Locate pressure and temperature sensing points sufficiently downstream from the control device to increase control loop time constant and minimize hunting.
2. Locate shut-off valves and 3-valve bypasses as specified in "Sensors" paragraph of this Section.
3. Locate sensors where accessible for maintenance and replacement.
4. Do not cover or conceal sensors with insulation.

D. Space Sensors: Install space sensors as follows.

1. Enclosures shall be tamperproof. Setpoint adjustment or settings shall not be visible or adjustable from outside sensor enclosure. Sensors shall be securely mounted and rigid.
2. Locate room thermostats and other room sensors approximately 48 inches above the floor (or as currently required by accessibility standards such as ADA) on inside wall where they will respond to average conditions in the space.
3. Sensors mounted on outside walls shall be mounted on factory made insulated brushed stainless steel bases.

E. Pressure Indicators: Provide each controller inside local field cabinets with instrumentation, pressure gauges, voltmeters or millimeters to show, at the controller location the condition of input power supply, input controller signal and branch line signal. Indicators shall be permanently mounted.

F. Duct Sensors: Select duct sensor locations to properly sense average air conditions, minimize vibration, avoid dead air spaces, and within velocity limits required by the manufacturer.
1. Provide velocity shields where required.
2. Securely mount or clamp averaging elements, maximum 3 feet on centers to the leaving side of coils and equipment. Insulate averaging elements from equipment and protect from vibration.
3. Provide separate duct flanges for each sensing device.
4. Provide gaskets or sealant where elements penetrate duct walls.
5. Mount sensor to allow easy removal and servicing without disturbing insulation or vapor barrier. Mount on stand off brackets to avoid condensation.
6. Coordinate the location for duct access doors downstream from each duct sensor.

3.4 TEST PLAN

A. Test Plan: Prepare a written test plan indicating in a step-by-step, logical fashion, the procedures by which the automatic control system will be tested, adjusted, and checked.

B. Pre-Approval: Not less than 6 weeks prior to testing, provide four copies of the proposed test plan for approval. Meet and discuss the test plan, and make agreed changes to the written plan.

C. Content: Plan shall include, as a minimum, for each system and sub-system of the automatic control work the following:
1. System name.
2. List of devices with brief description of functional purpose of each.
3. A description of the expected signal values transmitted by the sensor.
4. A description of the expected signal values transmitted by the controller to the control device or actuator.
5. A description of the expected values of the control medium from limit-to-limit.
6. A description of the instrumentation required to test the system.
7. A description of the expected field adjustments for transmitter, controller, and control actuator should control parameters fall outside of expected values.
8. A log sheet or sheets on which expected and field read values will be recorded and final field read values indicating that the system is operating in accordance with contract requirements.

3.5 TESTS DURING AND AFTER INSTALLATION

A. Instrumentation and Control: Calibration test each controller as follows:

1. Disconnect the sensor input signal to the controller and provide a compatible test signal generator.
2. Simulate expected transmitter values and input to the controller. Record controller branch line values.
3. Examine control device and determine that the device is responding.
4. Simulate maximum and minimum transmitter signal values and verify minimum and maximum controller output values and control device minimum and maximum stroke range.
5. Record all values and recalibrate controller as necessary to conform to specified control ramps, reset schedule, proportional relationship, reset relationship, and derivative reaction.
6. When the controller and control device portion of each loop are responding as designed, reconnect the sensor transmitter input line.
7. After mechanical equipment control becomes operational, perform an operational test of each control loop recording sensor, transmitter, controller input, controller output and control medium parameter.
8. Entire test shall be witnessed (refer to Division 1).
9. Upon satisfactory test a copy of final test results shall be bound in the operating and maintenance manual.

3.6 COMMISSIONING TESTS AND VERIFICATION

A. General: In addition to the tests required during and after installation of automatic control systems, the Contractor shall perform commissioning tests to verify that the entire automatic control systems are designed, installed, and adjusted to perform as required in the Contract. This phase is an extension, not a substitute, of the phase specified under the "Tests During and After Installation" article of this Section.

B. Calibration of Sensors and Verification of Control Operations: Demonstrate all calibration and tests specified in paragraphs "Instrumentation and Control" paragraph under "Tests During and After Installation" article of this Section, to the commissioning team.

C. Verify each and every control sequence specified in Part 2 of this Section.

D. Verification of Electronic Digital Controllers:
1. Verify the operation of microcomputer operating system of the field panels. Demonstrate proper automatic restart of equipment after power restoration.
2. Verify each and every required application software. They shall include, but not be limited to:
   a. All control sequences specified for each local loop
   b. Time of day scheduling
   c. Supply air reset
   d. Outdoor air reset
   e. Zero energy band program
   f. Unoccupied cycle.
3. Verify the operation of the operator's keypad, including levels of security to access the keypad, as specified in "Field Panel: Operator's Keypad" paragraph of Part 2 of this Section.
4. Verify self-diagnostics of field panel and annunciation of malfunctions at the central computer. Demonstrate activation of diagnostics from local operator's keypads. Each field panel shall be verified.
5. Verify the operation of the clock routine in the field panel and resetting of field panel clock by central computer.
6. Verify the operation of the intrusion alarm of field panel.
7. Demonstrate changing of default values of sensors through local keypads.

8. Demonstrate proper system operation while setpoints and data are being modified.

E. System Accuracy: System accuracies for each control loop, from end-to-end, shall be no less than those listed in "System Accuracy" paragraph under "Controllers" article of Part 2 of this Section.

F. Witnessing of Tests: All commissioning tests, verifications, and demonstrations shall be witnessed by the commissioning team.

G. Failure of Tests: Any test, verification, or demonstration fails to meet the Specification requirements, the component of the automatic control system causing the control system failure, be it hardware, firmware, or software, shall be repaired, replaced, or readjusted. The failed test, verification, or demonstration shall be repeated.

H. Test Report: Upon satisfactory tests of the automatic control systems, a copy of final test results shall be bound in the operating and maintenance manual.

3.7 DEMONSTRATION AND TRAINING

A. Demonstration: After completion of testing as hereinbefore specified, provide demonstration and training of designated operating personnel (refer to Division 1).
1. Demonstration shall be performed.
2. Demonstration shall include the operation of the entire mechanical system under the control of the Contractor and shall include the start-up, operation, and shutdown of the system in accordance with the sequence of operation.
3. The operation of each device shall be performed in accordance with the written instructions contained in the operation and maintenance manual, a copy of which shall be available 10 working days prior to the test. No deviation from procedures in the operating manual will be permitted.

B. Failure to Perform: Should the system fail to perform in accordance with the requirements of the operation and maintenance manual, the system shall be repaired, recalibrated, retested as necessary, and a second demonstration performed.
1. Subsequent demonstrations shall occur until the automatic control system and all associated mechanical and electrical equipment are operating in accordance with contract requirements.
2. All testing, retesting, and recalibration shall be at no additional expense. The Contractor shall reimburse the expenses of the commissioning team for each test after the first.

3.8 INSTRUCTING OPERATING PERSONNEL

A. Instructors and Superintendent: Upon completion of the work and acceptance by the Engineer, provide the services of an Instructor, who together with the superintendent specialist shall instruct designated operating personnel in the operation and maintenance of the automatic control system.

1. The services of the Instructor shall be available for not less than two 4-hour days of instruction.

2. The services of the superintendent specialist shall be available for not less than one 4-hour day.

3. Instructions shall be based upon the use of the operating and maintenance manual together with copies of the laminated control diagrams affixed adjacent to each local control panel.

4. Training and instruction will be witnessed. The witness shall monitor the entire training program, prepare a written report on the competency and effectiveness of instructors and the level of expertise of designated operators. A report will be submitted recommending additional training at additional cost, if such is deemed necessary.

3.9 SEQUENCE OF OPERATION

A. As described on drawings.

END OF SECTION

.

SECTION 23 30 00

AIR DISTRIBUTION

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. The work of this Section includes all labor, material, equipment and appurtenances indicated on the Drawings and herein specified for the installation of air distribution systems, including supply, exhaust, return, and outside air.

1.2 SUBMITTALS

A. General Ductwork Shop Drawings: Prepare shop drawings using AutoCad or equivalent computer aided drafting (CAD) based software. File format shall be compatible with AutoCAD 2014.dwg. Submit shop drawings of sheet metal ductwork as follows:
   1. For the Engineer, provide a CAD file, 2 printed plan sets of shop drawings. Provide additional printed sets and files as requested by Architect.
   2. Except as noted below, draw to a scale not less than 1/8-inch per foot.
   3. Provide sheet sizes equal or equivalent to Contract Drawings.
   4. Show duct sizes, where possible use even duct sizes.
   5. Show fitting details.
   6. Show ceiling diffusers and air flow quantities.
   7. Show ceiling light fixtures.
   8. Coordinate with other above ceiling services including structural, piping, plumbing, sprinkler, conduit and cable trays.

B. Coordinated Ductwork Shop Drawings: Provide coordinated shop drawings for sheet metal work in mechanical equipment rooms and other congested areas.
   1. Include the following in the required plan sets as described above.
   2. Draw to a scale of ¼-inch per foot.
   3. Show duct sizes.
   4. Show bottom duct elevations from finished floor.
   5. Show construction details of fittings.
   6. Show and accurately scale lighting fixtures, equipment, plumbing and mechanical piping, fire protection piping columns and beams, with mounting heights. Equipment drawings shall be for actual equipment to be installed per approved equipment submittals.

C. Duct schedule: Provide a duct schedule or table indicating the following information, according to appropriate pressure class:
   1. each duct size group (as defined in SMACNA “HVAC Duct Construction Standards”)
   2. duct sheetmetal gauge,
   3. duct joint and reinforcement spacing,
   4. transverse joint construction,
   5. intermediate reinforcement construction, and
   6. hanger type and spacing.

D. Air Devices: Submit manufacturer’s standard technical product data including capacity ratings, throw, noise, drop, diffusion, terminal velocities, adjustability, construction details, finish and mounting details.

1.3 AS-BUILT DRAWINGS

A. Maintain field changes on a drawing set at the construction site. These drawings shall be available at the construction site to the Architect/Engineer upon request.

B. Upon completion of the project, update the shop drawing CAD files to reflect the field changes.

1.4 COORDINATION OF WORK

A. Prior to producing shop drawings and installation of work, coordinate work with other trades including structural, plumbing, fire protection and electrical.

B. Verify all ceiling heights and construction details.

C. Lack of coordination of work will not be considered grounds for additional cost or time requests.

PART 2 - PRODUCTS

2.1 FLEXIBLE CONNECTIONS (Duro Dyne 'Metal Fab' or approved equivalent)

A. Provide and install where shown on the drawings and at all connections between ductwork and equipment subject to vibration or movement.

B. Product shall be U.L. classified, and shall meet the requirements of NFPA Standards 90A and 90B having connection material of an approved flame retardant fabric or with sleeve joints with packing of approved material, each having a flame spread rating not in excess of 25 and a smoke developed rating not in excess of 50.

C. Flexible connectors shall be installed upstream of any supply side fittings and take-offs and downstream of any return side fittings. Connections shall have suitable metal collar frames at each end. Allow at least one-inch slack in each connection to assure no vibration is transmitted from fan to ductwork. Connections shall be not less than four-inches long nor longer than ten-inches.

2.2 AIR DEVICES

A. Grilles, Registers and Diffusers - Anemostat, Krueger, Metal*Aire, Price, Titus, Tuttle&Bailey or Approved Equivalent
   1. Provide as shown and scheduled on the Drawings or as otherwise approved, to deliver the indicated volume of air without objectionable noise or draft.
   2. Provide grilles, registers, and diffusers with two coats of factory applied baked on white primer, unless otherwise scheduled on the Drawings.

B. Manual Volume Dampers: (Ruskin MD35, Air Balance AC-116, or Approved Equivalent)
   1. Provide factory made, opposed blade manual volume dampers where shown on the Drawings or where otherwise required for balancing the air flows of the system. Construct damper blades of minimum 16 gauge galvanized steel securely fastened to square operating rod of adequate cross-section to prevent distortion, of length as required and of 12-inch maximum width.
   2. Where penetration of a duct is made for an operating rod, the non-operator end penetration shall be made with a gasketed and capped end bearing such as Duro Dyne SB-338. On the operator end, the penetration shall be made as follows:
      a. Concealed Duct - gasketed end bearing such as Duro Dyne No.

SB-138; for duct above accessible ceiling, use a locking quadrant such as Duro Dyne No. K-4; for duct above a non-accessible ceiling, use a concealed regulator with chrome-plated cover such as Duro Dyne No.SB-380.

b. Exposed Duct - gasketed, locking indicator type regulator with acorn nut cap such as Duro Dyne No. SR-380.

c. For externally insulated ducts, provide appropriate devices to allow the operators to"stand-off" and be installed without compressing the insulation.

C. Access doors:

1. Provide factory made access doors where shown and where otherwise necessary to provide access for removal of filters, for cleaning upstream face of coils and for maintaining dampers of any kind.
2. Provide doors double walled with insulation between walls of same thickness as on ductwork.
3. Provide door shall be minimal 12"x12" nominal size where duct size permits,. Where duct size is smaller, provide door shall be as large as possible to fit into the duct.

2.3 FLEXIBLE DUCTWORK:

A. Construction: Provide ductwork conforming to UL 181, "Factory-Made Air Ducts and Connections," Class I, and NFPA 90A.

B. Insulation: R-6 minimum 2 inch thick, 0.76 pound per cubic foot fiberglass.

C. Sheath insulation with reinforced aluminized polyester vapor barrier having a permeance not exceeding 0.05 per ASTM E 96, "Standard Test Methods for Water Vapor Transmission of Materials," Procedure A.

D. Reinforcement: steel helical spring

E. Interior: non-porous, CPE or similar.

F. Pressure rating: 10” w.c. positive and 2” w.c. negative.

G. Taps: Provide boot or spin-in type as described on the drawings. Provide with damper with insulation standoff damper operator with quadrant lock.

2.4 SHEETMETAL DUCTWORK

A. General

1. Ductwork shall be made of single wall galvanized steel sheets. Ductwork shall be round or rectangular as shown on the Drawings. Straight pieces of round concealed ductwork shall be spiral lockseam or longitudinal snap-lock.
2. Ducts shall be constructed in accordance with the recommended construction for the appropriate pressure class insofar as gauges of metal to be used, bracing of joints and joint construction, fittings and fittings construction, etc., as established in HVAC DUCT CONSTRUCTION STANDARDS, Latest Edition, published by the Sheet Metal and Air Conditioning Contractors National Association, Inc., (SMACNA).

a. Ductwork shall be constructed to the following minimum pressure classes:

(1) Fan-coil, supply and return and downstream of VAV’s

(a) below 2,000 cfm ± 1"

(b) above 2,000 cfm ± 2"

(2) Air Handlers and RTUs

.

(a) Up to 3HP
(i) supply +2"
(ii) return -1"
(b) 3HP & up
(i) supply +3"
(ii) return -2"
(3) Exhaust - 1"

3. Sealing
a. Snap-lock duct and rectangular duct: seal all ducts to SMACNA Class 'A' rating, that is, "All transverse joints, longitudinal seams, and duct wall penetrations" shall be sealed.
b. Spiral lockseam: same sealing as snap-lock except sealing of longitudinal seams is not required.
c. A gasketed mechanical joint system such as Ductmate does not require sealing.
d. Sealant shall be water based product; solvent based products are expressly prohibited. Product shall be recommended by manufacturer for HVAC duct application and it shall cure to a flexible film with a strong adhesive bond to common duct materials. Product shall be rated by manufacturer for operating temperature limits from zero degrees F to 200 degrees F. Product shall have been tested per ASTM E84 procedures and shall have a maximum flame spread rating of 25, a maximum fuel contributed rating of 5, and a maximum smoke developed rating of 20. Product shall be Hardcast "Iron Grip" IG-601 or "Flex-Grip" FG-550, Rectorseal "Air-Lock", Foster 32-50, United McGill Duct Sealer, or approved equivalent.

B. Grease Ducts
1. Materials, design, construction, and installation of grease ducts shall conform to Uniform Mechanical Code (1985 ed.), NFPA 96 (1985) Removal of smoke and Grease-Laden Vapors from Commercial Cooking Equipment, and the aforementioned SMACNA documents.
2. Construct duct of not less than 16 gauge black steel or .044 inch thick stainless steel with joints and seams made liquid tight by welding or brazing.
3. Alternate : A factory made system, listed for such application, may be acceptable if approved by the local authority having jurisdiction.

C. Other Duct
1. Construct duct exhausting a dishwasher hood or a scullery hood of stainless steel in conformance with the aforementioned U.M.C. and SMACNA documents. Seal joints and seams with a non-hardening, flexible, water-proof sealant. Construct exposed joints and seams smooth with no sharp edges.
2. Construct clothes dryer vent of single wall stainless steel with joints and seams sealed with a water resistant adhesive tape such as Hardcast AFG-1402 "Foil-Grip". Provide clothes dryer vent with a manufactured aluminum cap

2.5 FIRE PROTECTION DAMPERS

A. Each damper shall be U.L. listed for the type and rating of the barrier. The Contractor shall verify all locations and ratings of barriers by cross referencing with Architectural Drawings.

B. The submittal for each damper type shall include a set of manufacturer's installation instructions. Instructions shall include information on any wall framing that is required to prepare the opening in the wall to accept the fire damper. The submittal will be considered incomplete without the installation instructions.

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C. Dampers shall be provided with fusible links designed to operate at temperatures specified in NFPA 13 according to classification.

D. Fire Dampers and Fire-Smoke dampers
   1. Wall or Floor Fire Dampers (Except for Thin Sidewall Air Devices in a Finished Wall)
      a. For duct dimension of 16-inches or less (as measured in the direction of damper closure) the damper shall be a type B or C.
      b. For duct dimension of more than 16-inches, the damper may be a type A, B, or C.
   2. Provide smoke dampers with 120 volt actuator.

E. Provide access doors in duct to allow maintenance and reset. Clearly label with large block red lettering.

PART 3 - EXECUTION

3.1 GENERAL

A. During construction, all air-moving equipment and ducts shall be protected from entrance of water, dust, trash, vermin, etc., per Section 15010. Fans of all types not yet connected to ductwork shall have inlets and outlets covered with plastic sheet secured temporarily with tape, wire, etc. Such covers shall be maintained throughout the construction phase until the ductwork is connected.

B. Ducts shall be routed in conjunction with pipes, electrical, conduits, lights, ceiling hangers, etc., so as to avoid interference insofar as possible.

3.2 CLEANING

A. Ducts, plenums, and casings shall be thoroughly cleaned of all debris and blown free of all small particles of rubbish and dust before installing outlet faces. Equipment shall be wiped clean, with all traces of oil, dust, dirt or paint spots removed. Temporary filters shall be provided for all fans that are operated during construction. New filters shall be installed after all construction dirt has been removed. Bearings shall be properly lubricated with oil or grease as recommended by the manufacturer. Belts shall be tightened to produce tension. All control valves and other miscellaneous equipment requiring adjustment shall be adjusted to settings indicated or as directed. Fans shall be adjusted to the speed indicated by the manufacturer to meet specified conditions.

3.3 DUCTWORK, GENERAL

A. Support
   1. Support each fitting that effects a change in direction, either vertical or horizontal, at the fitting.
   2. Support each fitting that has a branch intersection at the fitting.
   3. Support ductwork at or near connections to equipment.
   4. Support each duct independently. Do not support one duct from another except as allowed by SMACNA.
   5. Do not use wire as a hanger, even to support another hanging device such as a trapeze, regardless of acceptability by other authorities. Only straps, threaded rods, and channel may be used as hangers.

B. Install ductwork without twisting.

C. Install ductwork shown on the Drawings to be horizontal as straight and level as

possible; exception: duct with slope designed to provide drainage toward a device, such as grease exhaust duct or dishwasher exhaust duct.

D. Install ductwork shown on the Drawings to be vertical as vertical as possible in both vertical directions. Vertical ductwork extending more than one floor in height shall be supported at every floor or every 12 feet, whichever is less.

E. Install ductwork so that no duct or hanger is touching other duct or building elements such as framing, structure (except for supports), piping, conduit, etc.

3.4 SHEETMETAL DUCTWORK

A. In supporting sheetmetal ductwork, SMACNA, in HVAC Duct Construction Standards, Table 4-1 lists several combinations of hanger types and hanger spacing that are equivalent for various duct sizes. Contractor shall conform to one of the listed combinations (except for prohibited wire hangers).

B. Duct sealing material shall not be used to fill gaps caused either by careless or unprofessional work during fabrication or erection or by damage after erection. Surfaces on which sealant is to be applied shall be cleaned and dry before application. If any oil or grease is present, surface shall additionally have a degreaser applied.

C. Install duct liner where shown on drawings. Duct liner is used for acoustic attenuation only and is not to be applied in general.

D. Connections
1. Duct-to-duct connections or "splicing" is prohibited.
2. At sheetmetal taps and at air devices, insulation and outer jacket shall be slit and carefully peeled back approximately 4-inches.
3. Inner duct shall be secured tightly to the collar, without deformation of the collar, using a stainless steel draw band system.
4. Insulation shall be pulled back over duct and collar and snugly butted against the sheetmetal or air device. Insulation shall be snugly secured with another draw band without significant compression of the insulation.
5. A mastic type sealer shall be applied to the longitudinal cut in the duct outer jacket and all along the circumference of the butt joint between the flex duct and the sheetmetal duct. In addition to sealing the joints, the mastic material shall form a flexible, effective vapor seal.

3.5 FLEXIBLE DUCTWORK

A. Maximum length from take-off to air outlet shall be 8 feet.

B. Maximum one 90 degree bend in any length.

C. Provide continuous length with no intermediate joints.

D. Connect each end with stainless steel screw operated drawbands.

E. Support clear of the ceiling tile, light fixtures and air terminal

F. Support for maximum sag of 1/2-inch per foot.

G. Provide duct with UL labels visible every 10 feet indicating conformance to UL 181.

3.6 FIRE AND FIRE/SMOKE DAMPERS

A. Each damper shall be installed in strictest compliance with requirements set forth in the manufacturer's written instructions and in compliance with its listing.

B. Sleeves

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1. Provide and install each floor or wall fire damper with a sheetmetal sleeve, either 16 gauge (for dampers up to 36 inches wide by 24 inches tall) or 14 gauge (for dampers that exceed 36 inches in width or 24 inches in eight).
    a) Exception: sleeves in thicknesses less than stated above may be used if the sleeve and damper have been tested and listed in combination and are furnished as a unit from the factory.

C. Prohibited Installations - Damper installer shall not install or attempt to install a fire damper or combination damper unless the wall into which the damper is to go is properly constructed to receive the damper. The damper installer shall be responsible for communicating with and coordinating with the wall constructor so that the wall is properly constructed and that the opening is the proper size.
1. Gypsum Wall Reinforcing and Framing - Do not install a fire damper into an opening in a wall made of wood or steel studs with gypsum board outer layers unless the wall has been properly reinforced according to the damper manufacturer's installation instructions. Do not install a fire damper into such a wall unless the opening is properly framed on all sides according to the manufacturer's installation instructions
2. Opening Size - Do not install a fire damper into an opening in a wall unless the size of the opening is within the requirements as set forth in the damper manufacturer's installation instructions. In general, the opening must be as follows (for galvanized steel dampers and sleeves):
    a) a minimum of 1/8th inch per foot larger than the than the overall size of the damper and sleeve assembly, but not less than 1/4 inch for any size damper and sleeve assembly, and
    b) a maximum of 1/8th inch per foot plus one inch.

3.7 BALANCING OF SYSTEMS

A. Final balancing of the HVAC systems shall be performed by a Balancing Contractor as outlined elsewhere in the specifications.

B. Preparation of Air Distribution Systems for Final Balancing
1. Verify installation for conformity to design. All supply, return and exhaust ducts terminated and pressure tested for leakage as required by specification.
2. All volume, splitter, extractor and fire dampers properly located and functional. Dampers serving requirements of minimum and maximum outside air, return, relief and exhaust shall provide tight closure and full openings, smooth and free operation. Volume, fire, and fire/smoke dampers shall be in the full open position.
3. Verify that the return path in plenum return systems is completely open and unobstructed by wall closed to structure, structural elements and other such obstructions.
4. All supply, return, exhaust, transfer grilles, registers, diffusers installed and operational.
5. Air handling systems, units and associated apparatus, such as heating and cooling coils, filter sections, access doors, etc., shall be blanked and/or sealed to eliminate excessive bypass or leakage of air.
6. All fans (supply, return, circulating and exhaust) operating and verified for freedom from vibration, proper fan rotation and belt tension; heater elements to be of proper size and rating; record of motor amperage and voltage and verify they do not exceed nameplate ratings; and clean filters installed.

C. As a part of this project contract, the installing Contractors shall make any changes in the sheaves, belts, and drives and dampers as required by the Balancing (HVAC) Contractor to obtain performance, at no additional cost to the Owner.

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D. The General Contractor, the Mechanical Contractor, and the suppliers of the equipment installed shall all cooperate with the Balancing (HVAC) Contractor to provide all necessary data on the design and proper application of the system components and shall furnish all labor and material required to eliminate any deficiencies or malperformance.

E. The drawings and specifications indicate valves, dampers, and miscellaneous adjustment devices for the purpose of adjustment to obtain optimum operating conditions, and it will be the responsibility of the Mechanical Contractor to install these devices in a manner that will leave them accessible and readily adjustable. The Balancing (HVAC) Contractor shall be consulted if there is a questionable arrangement of a control or adjustable device.

F. During the balancing, the temperature regulation shall be adjusted for proper relationship between controlling instruments and calibrated by the Control Subcontractor using data submitted by the Balancing (HVAC) Contractor. The correctness of the final setting shall be proved by taking hourly readings for a period of 3 successive eight hour days, in a typical room on each separately controlled zone. The total variation shall not exceed 2 degrees from the present medium temperature during the entire temperature survey period.

G. In all fan systems, the air quantities shown on the plans may be varied as required to secure a maximum temperature variation of 2 degrees within each separately controlled space, but the total air quantity indicated for each zone must be obtained. It shall be the obligation of the Mechanical Contractor to furnish or revise fan drives and/or motors, if necessary, without cost to the Owner, to attain the specified air volumes.

H. The Mechanical Contractor shall assist the Balancing (HVAC) Contractor in performing three inspections within 90 days after occupancy of the building to insure that satisfactory conditions are being maintained throughout and to satisfy any unusual conditions.

I. The Mechanical Contractor shall assist the Balancing (HVAC) Contractor in performing inspections in the building during the opposite season from that in which the initial adjustments were made and at that time make any necessary modifications to the initial adjustments required to produce optimum operation of the systemic components, to produce the proper conditions in each conditioned space.

J. In order that all systems may be properly tested, balanced and adjusted as required herein by these specifications, the Mechanical Contractor shall operate the systems for the length of time necessary to properly verify their completion and readiness for balancing, testing, and adjusting and shall further, operate the systems during the balancing, testing, and adjusting period. The General Contractor shall have allowed sufficient funds in his project cost estimate and bid proposal to cover all work required in the balancing, testing, and adjusting phases as defined herein and as necessary for the completion of the balancing, testing and adjusting as determined by the Balancing (HVAC) Contractor.

K. The schedule for balancing, testing, and adjusting the HVAC systems shall be established by the General Contractor in coordination with the Balancing (HVAC) Contractor.

END OF SECTION

SECTION 23 34 00

HVAC FANS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Centrifugal roof and wall fans.

1.2 REFERENCES

A. American Bearing Manufacturers Association:
1. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
2. ABMA 11 - Load Ratings and Fatigue Life for Roller Bearings.

B. Air Movement and Control Association International, Inc.:
1. AMCA 99 - Standards Handbook.
2. AMCA 204 - Balance Quality and Vibration Levels for Fans.
3. AMCA 210 - Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.
4. AMCA 300 - Reverberant Room Method for Sound Testing of Fans.
5. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data.

C. American Refrigeration Institute:
1. ARI 1060 - Air-to-Air Energy Recovery Ventilation Equipment Certification Equipment Program.

D. National Electrical Manufacturers Association:
1. NEMA MG 1 - Motors and Generators.
2. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

E. Underwriters Laboratories Inc.:
1. UL 705 - Power Ventilators.

1.3 SUBMITTALS

A. Shop Drawings: Indicate size and configuration of fan assembly, mountings, weights, ductwork and accessory connections.

B. Product Data: Submit data on each type of fan and include accessories, fan curves with specified operating point plotted, power, RPM, sound power levels for both fan inlet and outlet at rated capacity, electrical characteristics and connection requirements.

C. Manufacturer's Installation Instructions: Submit fan manufacturers instructions.

D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.5 QUALITY ASSURANCE

A. Performance Ratings: Conform to AMCA 210 and bear AMCA Certified Rating Seal.

B. Sound Ratings: AMCA 301, tested to AMCA 300, and bear AMCA Certified Sound Rating Seal.

C. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.

D. Balance Quality: Conform to AMCA 204.

E. Energy Recovery Unit Wheel Energy Transfer Rating: Meet ARI 1060.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect motors, shafts, and bearings from weather and construction dust.

1.7 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.8 EXTRA MATERIALS

A. Furnish one extra set of belts for each fan.

PART 2 - PRODUCTS

2.1 CENTRIFUGAL ROOF AND WALL FANS

A. Manufacturers:
1. Acme Engineering and Manufacturing Corp.
2. Greenheck Corp.
3. Loren Cook Company.
4. Penn Ventilation.

B. Fan Unit: V-belt or direct drive, spun aluminum housing with grease tray; resilient mounted motor; aluminum wire bird screen; square base to suit roof curb with continuous curb gaskets.

C. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

D. Motor: Open drip proof or Totally enclosed fan cooled NEMA MG1.

E. Roof Curb: 14 inch self-flashing of galvanized steel or aluminum construction with continuously welded seams, built-in cant strips, 1 inch insulation and curb bottom, and factory installed nailer strip. Kitchen exhaust fan curbs shall be non-ventilated type.

F. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor NEMA 250 Type 3R enclosure.

G. Accessories:
1. Backdraft Damper: Gravity actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked.
2. Motor Operated Damper: Aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked and line voltage motor drive, power open, spring return.
3. Fan speed controller where scheduled.

H. Electrical Characteristics and Components:

1. Electrical Characteristics: As scheduled

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify roof curbs are installed and dimensions are as shown on shop drawings and instructed by manufacturer.

3.2 PREPARATION

A. Furnish roof curbs to Roofer for installation.

3.3 INSTALLATION

A. Run sheet metal duct though fan curb with flange at curb lip.

B. Provide sealing gasket between the fan and curb.

C. Secure roof fans to curb with stainless steel lag screws on all sides.

D. Install backdraft dampers on inlet to roof exhaust fans.

E. Install safety screen where inlet or outlet is exposed.

F. Provide sheaves required for final air balance.

3.4 CLEANING

A. Vacuum clean coils and inside of fan cabinet.

3.5 DEMONSTRATION

A. Demonstrate fan operation and maintenance procedures.

3.6 PROTECTION OF FINISHED WORK

A. Do not operate fans for until ductwork is clean, filters in place, bearings lubricated, and fan has been test run under observation.

END OF SECTION

SECTION 23 74 00

CENTRAL STATION AIR HANDLER

PART 1 GENERAL

1.1 WORK INCLUDED

A. Applied Air Handling Units.

1.2 REFERENCES

A. AMCA Publication 99 - Standards Handbook.

B. AMCA Publication 611 - Certified Ratings Program - Airflow Measurement Performance

C. AMCA Standard 500-D - Laboratory Methods of Testing Dampers for Rating.

D. ANSI/ABMA Standard 9 - Load Ratings and Fatigue Life for Ball Bearings.

E. ANSI/AMCA Standard 204 - Balance Quality and Vibration Levels for Fans.

F. ANSI/AMCA Standard 610 - Laboratory Methods of Testing Airflow Measuring Stations for Rating.

G. ANSI/AHRI Standard 410 - Forced Circulation Air-Cooling and Air-Heating Coils.

H. ANSI/AHRI Standard 430 - Central Station Air Handling Units.

I. ANSI/AHRI Standard 1060 - Rating Air-To-Air Energy Recovery Ventilation Equipment

J. ANSI/ASHRAE Standard 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.

K. ANSI/ASHARE Standard 62.1 - Ventilation for Acceptable Indoor Air Quality.

L. ANSI/ASHARE Standard 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.

M. ANSI/NEMA MG 1 - Motors and Generators.

N. ANSI/UL 900 - Standard for Safety Air Filter Units.

O. AHRI Standard 260 - Sound rating of Ducted Air Moving and Conditioning Equipment.

P. ASHRAE Standard 84 - Method of Testing Air-to-Air Heat Exchangers.

Q. ASHRAE Standard 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems.

R. ASTM B117 - Standard Practice for Operation Salt Spray Apparatus.

S. ASTM C1071 - Thermal and Acoustic Insulation (Mineral Fiber, Duct Lining Material).

T. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Material and Facings.

U. ASTM E477 - Standard Test Method for Measure Acoustical and Airflow Performance of Duct Liner

V. NFPA 70 - National Electrical Code

W. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilation Systems.

X. UL 1995 - Standard for Safety Heating and Cooling Equipment

1.3 QUALITY ASSURANCE

A. Air Coils: Certify capacities, pressure drops and selection procedures in accordance with current AHRI Standard 410.

B. Air handling units with fan sections utilizing single fans shall be rated and certified in accordance with AHRI Standard.

C. Air handling units with fan sections utilizing multiple fans shall be rated in accordance with AHRI Standard 430 for airflow, static pressure, and fan speed performance.

D. Airflow monitoring station: Certify airflow measurement station performance in accordance with AMCA 611.

1.4 SUBMITTALS

A. No equipment shall be fabricated or delivered until the receipt of approved shop drawings from the Owner or Owner's approved representative.

B. AHU manufacturer shall provide the following information with each shop drawing/product data submission:

1. All electrical, piping, and ductwork requirements, including sizes, connection locations, and connection method recommendations.

2. Each component of the unit shall be identified and mechanical specifications shall be provided for unit and accessories describing construction, components, and options.

3. All performance data, including capacities and airside and waterside pressure drops, for components.

4. Fan curves shall be provided for fans with the design operating points indicated. Data shall be corrected to actual operating conditions, temperatures, and altitudes.

5. A filter schedule must be provided for each air handling unit supplied by the air handling unit manufacturer. Schedule shall detail unit tag, unit size, corresponding filter section location within the AHU, filter arrangement (e.g. angled/flat), filter depth, filter type (e.g. pleated media), MERV rating, and filter quantity and size.

6. A schedule detailing necessary trap height shall be provided for each air handling unit. Schedule shall detail unit tag, unit size, appropriate trap schematic with recommended trap dimensions, and unit supplied base rail height. Contractor shall be responsible for additional trap height required for trapping and insulation beyond the unit supplied base rail height by adequate housekeeping pad.

7. An electrical MCA - MOP schedule shall be provided for each electrical circuit to which field-power must be supplied. Schedule to detail unit tag, circuit description, voltage/phase/hertz, Minimum Circuit Ampacity (MCA), and calculated Maximum Overcurrent Protection (MOP).

8. Sound data shall be provided using AHRI 260 test methods. Unit discharge, inlet, and radiated sound power levels in dB shall be provided for 63, 125, 250, 500, 1000, 2000, 4000 and 8000Hz.

C. The AHU manufacturer shall provide appropriate sets of submittals as referenced in the General Conditions and shall submit to the Owner electronic copies of the IOM.

D. The AHU manufacturer shall list any exceptions to the specification.

1.5 REGULATOR REQUIREMENTS

A. Agency Listings/Certifications

1. Unit shall be manufactured to conform to UL 1995 and shall be listed by either UL/CUL or ETL. Units shall be provided with listing agency label affixed to the unit. In the event the unit is not UL/CUL or ETL approved, the contractor shall, at his/her expense, provide for a field inspection by a UL/CUL or ETL representative to verify conformance. If necessary, contractor shall perform modifications to the unit to comply with UL/CUL or ETL as directed by the representative, at no additional expense to the owner.

2. Certify air handling units in accordance with AHRI Standard 430. Units shall be provided with certification label affixed to the unit. If air handling units are not certified in accordance with AHRI Standard 430, contractor shall be responsible for expenses associated with testing of units after installation to verify performance of fan(s). Any costs incurred to adjust fans to meet scheduled capacities shall be the sole responsibility of the contractor.

3. Certify air handling coils in accordance with AHRI Standard 410. Units shall be provided with certification label affixed to the unit. If air handling coils are not certified in accordance with AHRI Standard 410, contractor shall be responsible for expenses associated with testing of coils after installation to verify performance of coil(s). Any costs incurred to adjust coils to meet scheduled capacities shall be the sole responsibility of the contractor.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.

B. Units shall ship fully assembled up to practical shipping and rigging limitations. Units not shipped fully assembled shall have tags and airflow arrows on each section to indicate location and orientation in direction of airflow. Shipping splits shall be clearly defined on submittal drawings. Cost associated with non-conformance to shop drawings shall be the responsibility of the manufacturer. Each section shall have lifting lugs for field rigging, lifting and final placement of AHU section(s).

C. Deliver units to jobsite with fan motor(s), sheave(s), and belt(s) completely assembled and mounted in units.

D. Unit shall be shipped in a clear shrink-wrap or stretch-wrap to protect unit from in-transit rain and debris per ASHRAE 62.1 recommendations.

E. Installing contractor shall be responsible for storing AHU in a clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

1.7 START-UP AND OPERATING REQUIREMENTS

A. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters in place, bearings lubricated (if applicable), condensate properly trapped, piping connections verified and leak-tested, belts aligned and tensioned, all shipping braces removed, bearing set screws torqued, and fan has been test run under observation.

1.8 WARRANTY

A. AHU manufacturer shall provide, at no additional cost, a standard parts warranty that covers a period of one year from unit start-up or 18 months from shipment, whichever occurs first. This warrants that all products are free from defects in material and workmanship and shall meet the capacities and ratings set forth in the equipment manufacturer's catalog and bulletins.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Approved Manufacturers:

1.Trane

2.Temptrol

3.JCI “Ultra Thermal Break”

2.2 GENERAL

A. Manufacturer to provide an integral base frame for either ceiling suspension of units or to support and raise all sections of the unit for proper trapping of indoor unit. Contractor will be responsible for providing a housekeeping pad when unit base frame is not of sufficient height to properly trap unit. Unit base frames not constructed of galvanized steel shall be chemically cleaned and coated with both a rust-inhibiting primer and finished coat of rust-inhibiting enamel. Unit base height to be included in trap. Outdoor units shall have a 6-inch welded base and steel cross members for structural rigidity and supports the full perimeter of the air handling unit. AHU panels must overhang the primary unit base such that no ledge exists for water to pool. The entire AHU perimeter shall be sealed for additional water management protection.

2.3 UNIT CASING

A. Unit manufacturer shall ship unit in segments as specified by the contractor for ease of installation in tight spaces. The entire air handler shall be constructed of galvanized steel. Casing finished to meet ASTM B117 250-hour salt-spray test. The removal of access panels or access doors shall not affect the structural integrity of the unit. All removable panels shall be gasketed. All doors shall have gasketing around full perimeter to prevent air leakage. Contractor shall be responsible to provide connection flanges and all other framework that is needed to properly support the unit.

B. Casing performance - Casing air leakage shall not exceed leak class 6 (CL = 6) per ASHRAE 111 at specified casing pressure, where maximum casing leakage (cfm/100 ft2 of casing surface area) = CL X P0.65.

C. Under 55F supply air temperature and design conditions on the exterior of the unit of 81F dry bulb and 73F wet bulb, condensation shall not form on the casing exterior. The AHU manufacturer shall provide tested casing thermal performance for the scheduled supply air temperature plotted on a psychrometric chart. The design condition on the exterior of the unit shall also be plotted on the chart. If tested casing thermal data is not available, AHU manufacturer shall provide, in writing to the Engineer and Owner, a guarantee against condensation forming on the unit exterior at the stated design conditions above. The guarantee shall note that the AHU manufacturer will cover all expenses associated with modifying units in the field should external condensate form on them.

D. Unit casing (wall/floor/roof panels and doors) shall be able to withstand up to 1.5 times design static pressure, or 8-inch w.g., whichever is less, and shall not exceed 0.0042 per inch of panel span deflection (L/240) at 8-inch w.g.

E. Unit casing panels shall be 2-inch double-wall construction, with solid galvanized exterior and solid galvanized interior, to facilitate cleaning of unit interior.

F. Unit casing panels (roof, walls, floor) and doors shall be provided with a minimum thermal resistance (R-value) of 13 Hr*Ft2*°F/BTU.

G. Unit casing panels (roof, walls, floor) and external structural frame members shall be completely insulated filling the entire panel cavity in all directions so that no voids exist. Panel insulation shall comply with NFPA 90A. Casing panel inner liners must not extend to the exterior of the unit or contact the exterior frame. A mid-span, no-through-metal, internal thermal break shall be provided for all unit casing panels.

H. Floor panels shall be double-wall construction and designed to support a 250-lb load during

maintenance activities and shall deflect no more than 0.0042 per inch of panel span. Floors in walk in access section shall be furnished with 1/8” aluminum tread plate.

I. Access doors shall be provided in all sections to allow easy access to drain pan, coil(s), motor, drive components and bearings for cleaning, inspection, and maintenance.

J. Access panels and doors shall be fully removable without the use of specialized tools to allow complete access of interior surfaces.

K. External surfaces of all outdoor unit casings shall be prepared and painted with a minimum 1.5 mil thick enamel finish or equal. Paint shall be able to withstand a salt spray test in accordance with ASTM B117 for a minimum of 500 consecutive hours. Paint shall be AHU Manufacturer’s standard color, unless otherwise indicated in the schedule and drawings.

2.4 Access Doors

A. Access doors shall be 2-inch double-wall construction. Interior and exterior shall be of the same construction as the interior and exterior wall panels.

B. All doors shall be provided with a thermal break construction of door panel and door frame.

C. Gasketing shall be provided around the full perimeter of the doors to prevent air leakage.

D. Door hardware shall be surface-mounted to prevent through-cabinet penetrations that could likely weaken the casing leakage and thermal performance.

E. Handle hardware shall be designed to prevent unintended closure.

F. Access doors shall be hinged and removable without the use of specialized tools to allow.

G. Hinges shall be interchangeable with the door handle hardware to allow for alternating door swing in the field to minimize access interference due to unforeseen job site obstructions.

H. Door handle hardware shall be adjustable and visually indicate locking position of door latch external to the section.

I. All doors shall be a 60-inch high when sufficient unit height is available, or the maximum height allowed by the unit height.

J. A shatterproof window shall be provided in fan section doors.

2.5 PRIMARY DRAIN PANS

A. All cooling coil sections shall be provided with an insulated, double-wall, stainless steel drain pan.

B. The drain pan shall be designed in accordance with ASHRAE 62.1 being of sufficient size to collect all condensation produced from the coil and sloped in two planes, pitched toward drain connections, promoting positive drainage to eliminate stagnant water conditions when unit is installed level and trapped per manufacturer's requirements. See section 2.07, paragraph F

through H for specifications on intermediate drain pans between cooling coils.

C. The outlet shall be located at the lowest point of the pan and shall be sufficient diameter to preclude drain pan overflow under any normally expected operating condition.

D. All drain pan threaded connections shall be visible external to the unit. Threaded connections under the unit floor shall not be accepted.

E. Drain connections shall be of the same material as the primary drain pan and shall extend a minimum 2-1/2-inch beyond the base to ensure adequate room for field piping of condensate traps.

F. The installing contractor is responsible to ensure the unit is installed level, trapped in accordance with the manufacturer's requirements, and visually inspected to ensure proper drainage of condensate.

G. Coil support members inside the drain pan shall be of the same material as the drain pan and coil casing.

H. If drain pans are required for heating coils, access sections, or mixing sections they will be indicated in the plans.

2.6 FANS

A. Fan sections shall have a minimum of one hinged and latched access door located on the drive side of the unit to allow inspection and maintenance of the fan, motor, and drive components. Construct door(s) per Section 2.04.

B. Provide class II SWSI AF direct drive plenum fans sized as indicated on the schedule. Fan shafts shall be solid steel, coated with a rust-inhibiting coating, and properly designed so that fan shaft does not pass through first critical speed as unit comes up to rated RPM. All fans shall be statically and dynamically tested by the manufacturer for vibration and alignment as an assembly at the operating RPM to meet design specifications. Fans controlled by variable frequency drives shall be statically and dynamically tested for vibration and alignment at speeds between 25% and 100% of design RPM. If fans are not factory-tested for vibration and alignment, the contractor shall be responsible for cost and labor associated with field balancing and certified vibration performance. Fan wheels shall be keyed to fan shafts to prevent slipping.

C. Fan airflow measurement stations shall be provided to measure fan airflow. The accuracy of the devices shall be no worse than +/- 5 percent when operating within stable fan operating conditions. Devices shall not affect the submitted fan performance and acoustical levels. Devices that obstruct the fan inlet or outlet shall not be acceptable. Devices shall be connected to transducers with selectable 4-20 mA or 2-10 VDC output. Signal shall be proportional to air velocity.

D. MOTORS AND DRIVES

1. All motors and drives shall be factory-installed and run tested.

2. Motors shall meet or exceed all NEMA Standards Publication MG 1 - 2006

requirements and comply with NEMA Premium efficiency levels when applicable. Motors shall comply with applicable requirements of NEC and shall be UL Listed.

3. Fan Motors shall be heavy duty, open drip-proof operable at 460 volts, 60Hz, 3-phase. If applicable, motor efficiency shall meet or exceed NEMA Premium efficiencies.

4. Use 4-pole, 1800 rpm, motors, NEMA B design, with Class B insulation, capable to operate continuously at 104 deg F (40 deg C) without tripping overloads.

5. Motors shall have a +/- 10 percent voltage utilization range to protect against voltage variation.

2.7 COILS

A. Coils section header end panel shall be removable to allow for removal and replacement of coils without impacting the structural integrity of the unit.

B. Install coils such that headers and return bends are enclosed by unit casing to ensure that if condensate forms on the header or return bends, it is captured by the drain pan under the coil.

C. Coils shall be manufactured with configured aluminum plate fins to minimize water carryover and maximize airside thermal efficiency. Fin tube holes shall have drawn and belled collars to maintain consistent fin spacing to ensure performance and air pressure drop across the coil as scheduled. Tubes shall be mechanically expanded and bonded to fin collars for maximum thermal conductivity. Use of soldering or tinning during the fin-to-tube bonding process is not acceptable due to the inherent thermal stress and possible loss of bonding at that joint. Tubes shall be 0.025” thick copper.

D. Headers shall be copper with red brass connection nipples.

E. Construct coil casings of stainless steel. End supports and tube sheets shall have belled tube holes to minimize wear of the tube wall during thermal expansion and contraction of the tube.

F. All coils shall be completely cleaned prior to installation into the air handling unit. Complete fin bundle in direction of airflow shall be degreased and steam cleaned to remove any lubricants used in the manufacturing of the fins, or dirt that may have accumulated, in order to minimize the chance for water carryover.

G. When two or more cooling coils are stacked in the unit, an intermediate drain pan shall be installed between each coil. The intermediate drain pan shall be designed being of sufficient size to collect all condensation produced from the coil and sloped to promote positive drainage to eliminate stagnant water conditions. The intermediate drain pan shall be constructed of the same material as the sections primary drain pan.

H. The intermediate drain pan shall begin at the leading face of the water-producing device and be of sufficient length extending downstream to prevent condensate from passing through the air stream of the lower coil.

I. Intermediate drain pan shall include downspouts to direct condensate to the primary drain pan. The intermediate drain pan outlet shall be located at the lowest point of the pan and shall be

sufficient diameter to preclude drain pan overflow under any normally expected operating condition.

2.8 FILTERS

A. Provide factory-fabricated filter section of the same construction and finish as unit casings. Filter section shall have side access filter guides and access door(s) extending the full height of the casing to facilitate filter removal. Construct doors in accordance with Section 2.04. Provide fixed filter blockoffs as required to prevent air bypass around filters. Blockoffs shall not need to be removed during filter replacement. Filters to be of size, and quantity needed to maximize filter face area of each particular unit size.

B. Filter type, MERV rating, and arrangement shall be provided as defined in project plans and schedule

C. Provide 3 complete sets of filters.

D. Each filter section shall be provided with a factory-installed, flush-mounted Dwyer dial-type differential pressure gauge piped to both sides of the filter to indicate status. Gauge shall maintain a +/- 5 percent accuracy within operating temperature limits of -20°F to 120°F. Filter sections consisting of pre- and post-filters shall have a gauge for each bank of filters.

2.9 DAMPERS

A. All dampers, with shall be internally mounted. Dampers shall be premium ultra low leak and located as indicated on the schedule and plans. Blade arrangement (parallel or opposed) shall be provided as indicated on the schedule and drawings. Dampers shall be Ruskin CD60 double-skin airfoil design or equivalent for minimal air leakage and pressure drop. Leakage rate shall not exceed 4 CFM/square foot at one-inch water gauge complying with ASHRAE 90.1 maximum damper leakage and shall be AMCA licensed for Class 1A. All leakage testing and pressure ratings shall be based on AMCA Standard 500-D. Manufacturer shall submit brand and model of damper(s) being furnished, if not Ruskin CD60.

2.10 MARINE LIGHTS

A. Marine lights shall be provided throughout AHUs as indicated on the schedule and plans. Lights shall be instant-on, light-emitting diode (LED) type to minimize amperage draw and shall produce lumens equivalent to a minimum 75W incandescent bulb (1200 lumens). LED lighting shall provide instant-on, white light and have a minimum 50,000 hr life.

B. Light fixture shall be weather-resistant, enclosed and gasketed to prevent water and dust intrusion.

C. Fixtures shall be designed for flexible positioning during maintenance and service activities for best possible location providing full light on work surface of interest and not being blocked by technician.

D. All lights on a unit shall be wired in the factory to a single on-off switch.

E. Installing contractor shall be responsible for providing 115V supply to the factory-mounted marine light circuit.

2.11 Factory Wiring VFDs (Indoor and Outdoor Units)

A. VFDs shall be wired per NEC, UL, and NFPA 90A requirements.

B. All power wiring for voltages greater than 24V and traveling through multiple unit sections shall be contained in an enclosed, metal, power-wiring raceway or EMT. Sections less than 6-inch in length may be contained in FMC.

C. After mounting and wiring of VFDs, on the AHUs, trained factory personnel shall ensure proper operation of each VFD, through a thorough factory test. Testing shall include a Hypot test of unit wiring to ensure that no weaknesses exist in wiring or motor. Each VFD shall be energized and the fan run to ensure the VFD will operate throughout the usable range of the drive and that the fan rotation is correct. Each VFD with bypass shall also be tested in the bypass position to ensure the bypass is operational.

PART 3 EXECUTION

3.1 INSTALLATION

A. Block off or cap or otherwise seal openings in the cabinet to prevent entry of dirt and debris until connections are made.

B. Remove all shipping blocks and restraints.

C. Open access panels and inspect unit for any abnormalities,

D. Water connections
1. Make water connections so that access for repair or maintenance is not obstructed or compromised.
2. Before making water connections, verify that entire water piping system has been flushed and cleaned.
3. Verify that water piping system is purged of air and that water connections are made correctly and not leaking.

E. Make condensate drain connection. Verify that drain is properly trapped, vented, and sloped to a floor drain as shown on the drawings.

F. Make duct connections using flexible connectors. Verify that duct is independently and adequately supported.

G. Clean the exterior of each unit to remove dirt, debris, etc.

3.2 CHECK-OUT
After complete installation but before start-up, verify the following.

A. Unit properly installed and level,

B. Interior of each section is clean and free of debris, dirt, loose components, etc.,

C. Correct voltage supplied,

D. Correct size wire, fuses, and breakers are installed,

E. Low voltage wiring correct and complete,

F. Water system flushed to remove all dirt and debris,

G. All air purged from the water side,

H. All water controls and isolation valves open and ready for adjustment,

I. Condensate drain lines correctly pitched and unrestricted,

J. Blower rotates freely and set on correct speed,

K. Clean air filter properly installed,

L. All shipping blocks, packing, shipping screws, etc. are removed.

M. All access panels and covers in place and properly secured, and

N. Thermostat set in the "off" position.

3.3 START-UP

A. Before start-up, inspect the interior of each section to verify that it is clean and free of debris, dirt, and loose components. Install new filters. Do not attempt to start-up a dirty unit or without filters.

B. System start-up shall be under the direct supervision of factory trained representative and shall be per manufacturer's written instructions.

C. Factory representative shall prepare and provide a start-up report.

D. Do not run equipment prior to installation of proper filters.

E. Properly maintain the equipment if used during the construction phase of the project.

F. Thoroughly clean the unit interior including coils, filters, fan wheels, casing and other components immediately prior to substantial completion.

END OF SECTION

SECTION 23 81 10

PACKAGED MAKE-UP AIR CONDITIONING UNITS

PART 1 - GENERAL

1.1 REFERENCES

A. ANSI/NFPA 90A - Installation of Air Conditioning and Ventilation Systems.

B. ARI 360 - Unitary Air-Conditioning Equipment.

C. ANSI/ASHRAE 90A - Energy Conservation in New Building Design

D. ARI 370 - Sound Rating of Large Outdoor Refrigerating and Air Conditioning Equipment.

1.2 SUBMITTALS

A. Submit drawings indicating components, dimensions, weights and loadings, required clearances, and location and size of field connections.

B. Submit product data indicating rated capacities, weights, accessories, service clearances and electrical requirements.

C. Submit manufacturer's installation instructions.

1.3 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data.

B. Include manufacturer's descriptive literature, start-up and operating instructions, installation instructions, and maintenance procedures.

1.4 HANDLING

A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.

B. Protect units from physical damage. Leave factory shipping covers in place until installation.

1.5 WARRANTY

A. Provide a full parts warranty for one year from start-up or 18 months from shipment, whichever occurs first.

B. Provide five year extended warranty for compressors including parts and labor to field rebuild, or for furnishing a remanufactured compressor.

1.6 MAINTENANCE SERVICE

A. Furnish complete service and maintenance of packaged rooftop units for one year from Date of Substantial Completion by Contractor. Include annual inspection and coil cleaning.

1.7 REGULATORY REQUIREMENTS

A. Unit shall conform to UL 1995/CSA 22.2 #236 for construction of packaged air conditioner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Trane

B. Aaon

C. Carrier

D. York

E. McQuay

2.2 GENERAL UNIT DESCRIPTION

A. Units furnished and installed shall be cooling only packaged rooftops as specified on the contract documents and within these specifications. Cooling capacity ratings shall be based upon ARI Standard 360. Units shall consist of insulated weathertight casing with compressors, air cooled condenser coil, condenser fans, evaporator coil, filters, supply and/or exhaust fan motors and drives, and unit controls.

B. Units shall be single piece construction as manufactured at the factory. Site assembled sub-assemblies will not be allowed. Package units shall be constructed for installation on a concrete slab full perimeter support under air handler section and pedestal support under condenser section.

C. Units shall be factory run tested to include the operation of all fans, compressors, heat exchangers, and control sequences.

D. Each Make-up Air Unit to be configured and manufactured as one unit, shipped to the job site in one piece. The unit must incorporate the following sections but not limited to:

1. Fresh air inlet louver. Inlet hoods shall be unacceptable due to space constraints
2. Fresh air inlet damper
3. Supply air fan section
4. Gas Heating Section
5. Main Expansion Coil Packaged Refrigeration System

E. Units shall have labels, decals, and/or tags to aid in the service of the unit and indicate caution areas.

2.3 UNIT CASING

A. Base: Construct base of welded structural steel G shape 10 ga. and welded steel cross supports and integral lifting lugs. Bolted bases are unacceptable. Base shall be insulated and provided with a 22 ga. G90 galvanized steel bottom liner. Coat base with 2 part epoxy primer and urethane modified enamel top coat.

B. Casing: (post and frame construction) the frame shall be 16 ga. G90 galvanized frame, 22 ga. galvanized outer wall, and 22 ga. galvanized inner wall. The base frame is to be 10 ga. formed and welded structural base, painted with a gray finish. If casing is load bearing, the exterior shall be a minimum 16 ga. and interior shall be minimum 20 ga. Frame is constructed of formed galvanized members designed to support flush-mounted double-wall panels. Framing must have gasket between support members and panels. Panels must be thermal break construction. All interior walls, floor, and roof shall be double wall and insulated. Casings (including roof and floor) are to be insulated with 2 lb/ft3 urethane foam insulation having an average R-value of 6 per inch.

C. Access Doors: Provide 2” double wall polyurethane foam injection filled insulated (R-12) doors with extruded aluminum frame and full height stainless steel piano hinges, minimum two compression latches, and minimum 24” clear opening width. Provide access doors c/w tie backs. Supply and exhaust air streams shall not be covered by a single door. Provide doors for access to filters, fans, heat exchangers and any area requiring access for routine maintenance. Access panels in lieu of access door are unacceptable.

D. Control Panel: The unit control panel section shall be compartmented to separate high and low voltage components. The control panels shall also be fully gasketed, hinged and provided with quick release latches for easy access.

E. Insulation: All interior walls, floor, and roof shall be double wall and insulated. Wall casings are insulated with 2 lb/ft3 urethane foam insulation having an average R-value of 6 per inch. Floors shall be insulated to achieve minimum R16, walls and roof to achieve R12. No insulation shall be exposed to the air stream or under the unit floor.

F. Inlet Louvers: Drainable blade louvers with bird-screens are to be provided for the exposed inlets. The louvers are to be manufactured of extruded aluminum.

G. Roof (for outdoor units): Provide roof with standing seam construction. Pitch roof with sufficient slope to ensure water drainage. 1 ½” Roof overhang to be provided around complete perimeter of unit.

H. Coil Headers: All coil headers are to be enclosed in the supply airstream to minimize external heat transfer and maximize system efficiency.

I. Leakage and deflection requirements. Casing Ratings; Maximum casing panel deflection shall not exceed L/6000th at 9” w.c. TSP (where L is the longest panel span on the unit). Casing shall meet a SMANCA duct class leakage rating of 5 at 9” w.c. TSP.

J. Floor: Floor shall be insulated with 2” polyurethane foam insulation and provided between 18 ga. Floor surface with 22 ga. backing. A sealed 22 gauge standing seam G90 galvanized steel subfloor shall be provided in addition with perimeter weep holes through the G-rail base to prevent moisture infiltration

2.4 AIR FILTERS

A. Air Filters: Filters shall mount integral within unit casing and be accessible via hinged access panels.

1. Pre-Filters shall be two inch pleated media 30% as tested by ASHRAE 52-76, MERV 7.
2. All filters shall be housed within the unit itself and not the curb.

B. Provide at least 3 complete sets of filters, change filters before air balance. Turn over a new set of filters to the owner at the completion of the project.

C. Provide Differential Pressure gauges with adjustable switches to indicate filter loading for each filter bank. Dwyer Photohelic with 4” face, suitable for outdoor installation. Provide filter gauge tubing set. Pipe with hard drawn copper tubing.

2.5 FANS

A. Direct Drive Fan Motor:

1. Base fan performance at standard conditions (density 0.075 lb/ft^3)
2. Each fan shall be direct drive in AMCA arrangement 4 only.
3. Fans are equipped with lifting lug points.
4. After fabrication all carbon steel components shall be cleaned and chemically treated by a phosphatizing process to insure proper removal of grease, oil, scale, etc. Fan shall then be coated with a minimum of 2-4 mils of Permatector (polyester Urethane),

electrostatically applied and baked. Finish color shall be grey. Coating must exceed 1,000 – hour salt spray under ASTM B117 test method. No uncoated steel fan and fan housing parts will allowed.

B. Fan Housing

1. Plenum fans shall be of the un-housed direct drive centrifugal type.
2. Fan plate shall be aerodynamically design with high-efficiency inlet, engineered to reduce incoming air turbulence.
3. Panels and frame work shall be constructed of heavy gage, precision laser cut and die formed ASTM A-569 low carbon steel to provide a rigid structure to support the shaft and bearings and reduce low frequency vibration.
4. Fan base angles shall be recessed to reduce overall width of the assembly.
5. After fabrication all carbon steel components shall be cleaned and chemically treated by a phosphatizing process to insure proper removal of grease, oil, scale, etc. Panels and framework shall be coated with a minimum of 2-4 mils of Permatector (Polyester Urethane), electrostatically applied and baked. Finish color shall be gray. Coating must exceed 1,000-hour salt spray under ASTM B117 test method. No uncoated steel fan parts will be allowed.

C. Fan Wheel

1. The fan wheel shall be non-overloading airfoil centrifugal type. Wheels shall be statically and dynamically balanced to balance grade G6.3 per ANSI S2.19 at the factory.
2. The fan wheel shall be manufactured with a minimum of 12 continuously welded aluminum airfoil blades to move the blade pass the frequency into the mid-octave bands and minimize noise.
3. The entire wheel shall be constructed of aluminum to reduce the rotational weight of the wheel and reduce vibration. Fan sizes through 49 shall use 6063-T5 extruded aluminum blades, fan sizes greater than 49 shall use 5052-H32 laser cut and die formed aluminum blades to ensure precision blade tolerances, improve efficiency and reduce vibration.
4. Wheel hubs shall be cast of 319 aluminum alloy.
5. Aluminum fan wheels shall not require finish coating.
6. The wheel and fan inlet shall be carefully matched and shall have precise running tolerances for maximum performance and operating efficiency.
7. Provide sealed bearings.

D. Fan Motor

1. Motors shall meet or exceed EPACT (Energy Policy ACT) efficiencies. Motors shall be NEMA T frame, 720, 900, 1200, 1800, or 3600 RPM 60 Hz. Total Enclosed Fan Cooled (TEFC) with a 1.15 service factor.
2. Structural steel bases to be designed and manufactured by the fan supplier to ensure proper alignment of the fan and motor and structural integrity of the base to prevent vibration. Provide 1” deflection Seismic vibration isolation.
3. Fans shall be provided with direct drive spring isolated unitary fan/motor base, flex connectors, TEFC High Eff. Motors, adjustable motor bases, extended lube lines routed to the nearest access door. Fan brake horsepower shall not exceed 85% of motor horsepower. All motors shall comply with EPACT efficiency requirements.
4. Drives: Direct drive with VFD control. Variable Frequency drives shall be provided with all fan motors to provide soft start and for final balancing. Bypass not required.

5. All high voltage wiring external to control cabinet is to be run in EMT, liquid tight conduit or flex conduit. High voltage wiring exposed to weather to be installed in EMT or liquid tight conduit.

E. Airflow Monitoring

1. A factory installed and factory tested airflow monitoring station shall be provided at the supply air fan(s). Airflow monitoring station shall provide feedback to an LCD key pad provided with the unit to ensure proper air-flow. The LCD keypad shall display the leaving air volume in cubic feet per minute.
2. The Airflow Monitoring system shall be manufactured by Greenheck Sure-Air or approved equal. The system must not induce any effects on the fan performance and shall be an integral part of the plenum fan bell mouth. The system is used to read the volumetric flow rate as listed in the schedule.
3. The Airflow monitoring system shall be wired to the unit mounted controller. The controller will supply a digital read out in cubic feet per minute. The BACnet communications must also be able to read this digital readout.
4. The Airflow monitoring station to feed back to the VFD on the Supply Air Fan(s), so it can modulate the fan speed to correct for differing pressure drop across filter/coil. Unit controls to vary VFD to allow for control of specified air flow.

F. Accessories

1. Motors shall meet or exceed EPACT (Energy Policy ACT) efficiencies. Motors shall be NEMA T-frame, 720, 900, 1200, 1800 or 3600 RPM in 60 Hz (750, 1000, 1500 or 3000 RPM in 50 Hz), Open Drip Proof (ODP) or Totally Enclosed Fan Cooled (TEFC) with a 1.15 service factor.
2. Structural steel bases to be designed and manufactured by the fan supplier to ensure proper alignment of the fan and motor and structural integrity of the base to prevent vibration.
3. Seismic rated 1” spring isolation provided on all fans.
4. Variable Frequency Drives: Provide variable speed drive for supply, fresh air and exhaust fans. VFD’s shall be factory installed and wired. VFD’s shall be mounted on the inside of the unit behind the access door.

2.6 VARIABLE FREQUENCY DRIVE (VFD)

A. Include Factory engineered, tested, mounted and wired Variable Frequency Drives for the Supply and Return/Exhaust Fans.

B. Units shall transform 60 Hz. input power into frequency and voltage controlled three phase output suitable to provide positive speed control to standard induction motors. Speed control shall be stepless throughout speed range under variable torque loads on a continuous basis. Control shall incorporate non-switching input section with minimum 95% inverter efficiency at all speeds above 25% of full speed. Drive logic shall be microprocessor based and PWM voltage output shall be sine wave coded, resulting in a quasi-sinusoidal output current waveform to minimize harmonics.

C. Drives shall allow for low-noise operation using IGBT's (Insulated Gate Bipolar Transistors - a Bipolar type MOS-FET). An output filter shall be available to reduce motor noise due to PWM waveform. The carrier frequency for the sine wave PWM control shall be capable of changing to prevent resonance in the mechanical system.
1. All discrete electronic components shall be assembled on modular printed circuit boards which can be replaced without soldering of connections. Motor speed controllers shall have capability to interface with a Direct Digital Control (DDC) Energy Management System (EMS).
2. Self-protection Features:

a. Current limiter shall be capable of limiting output current to 110% of the inverter rating. Current limiter shall be designed to function automatically to prevent overcurrent trip due to momentary overload conditions, allowing inverter to continue operation.
b. Instantaneous overcurrent trip shall safely limit output current to 150% of rated current to under 50 microseconds due to phase short circuit or severe overload conditions.
c. Undervoltage trip shall protect the inverter due to non-momentary power or phase loss. Undervoltage trip shall activate automatically when line voltage drops 10-15% below rated input voltage.
d. Overvoltage trip shall protect the inverter due to voltage levels in excess of 10-15% of nominal line voltage.
e. Over temperature trip shall protect inverter from elevated temperatures in excess of component rating. Over temperature trip indicator shall illuminate continuously if a unit is tripped on over temperature.
f. Inverter logic shall allow trip condition resulting from overcurrent, undercurrent, over temperature, or overvoltage to automatically reset, and inverter shall automatically restart upon correction of trip condition. Number of restart attempts shall be limited to five (5). If after five attempts, restart is not successful, inverter shall shutdown safely and require a manual restart. If successful restart occurs, restart circuit counter shall reset to zero (0) counts after approximately ten (10) minutes of uninterrupted operation.
g. In event of power loss, control shall be designed to shutdown safely without component failure. Upon return of power, system shall be designed to automatically return to normal operation and restart into a rotating motor, or shutdown and then restart without component damage.
h. In the event of a phase-to-phase short circuit, control shall be designed to shutdown safely without component damage.

3. No damage to units shall result in the event that an input or output power contactor, disconnect switch, or circuit breaker is opened or closed while control is activated.
4. To facilitate start-up and service, controllers shall be designed to operate without motor or auxiliary equipment connected to inverter output.
5. Operational Features:
   a. Nominal 0-5 volt DC signal shall be provided for Owner's use. Signal shall vary in direct proportion to controller speed.
   b. Controllers shall be suitable for operation in a 104 degrees F/95% RH (non-condensing) environment. Units shall not be installed in direct sunlight or mounted on any surface exceeding 104 degrees F.
   c. Hand/Off/Auto switch and manual speed potentiometer shall be provided on front of enclosure. When switch is in "hand" position, a unit shall be enabled and potentiometer shall control speed. When switch is in "auto" position, a controller shall be controlled by an input control signal provided an external "enabling" contact is closed.
   d. Acceleration time from zero to full speed shall be adjustable from thirty (30) to three hundred (300) seconds. Deceleration time shall be independently adjustable for same range. Maximum frequency (speed) potentiometer adjustment shall be available to limit drive output to less than 60 Hz. frequency selectable.
   e. Provide output of VFD speed in terms of percentage or Hertz to connect to the control system.
   f. Frequency, voltage, and ampere meters shall be located on front panel.
6. Provide built-in input line and load reactors.

2.7 HEATER SECTION

A. Gas Heat Section:

1. Provide Indirect fired natural gas heater: Provide with performance as specified in the schedule. Furnace shall be ETL listed using ANSI Z83.8 standards. Furnace shall have tubular heat exchanger constructed of 304 stainless steel. Tubes shall have integral formed dimples to maximize heat transfer and condensate drainage. Burner assembly shall include in shot type burners, electric spark ignition system, high temperature safety

control, air proving switch and draft diverter. Allowable gas inlet pressure is 7" to 14" w.c. Control of the furnace shall be by the factory provided and mounted DDC controller.

2. Provide with minimum 8 to 1 turndown controlled off LAT sensor. LAT to be set to 75 degrees F (adjustable).
3. Heat enabled when outside air is below 70 degrees adjustable and space is occupied.

2.8 EVAPORATOR COIL SECTION

A. Coils

1. DX cooling coils: Provide ARI rated coil with 0.02" thick seamless copper tubes and 0.0075" thick aluminum fins. The complete coil core is tested to 700 pounds air pressure under warm water and guaranteed for 466 psig working pressure. Provide IAQ drain pan under the coil extending past the coil to ensure condensate retention. Maximum face velocity on 100% outside air coil is 425 FPM and 550 FPM on the cold deck coil.
2. Independent circuits shall be provided completely tested, dehydrated, and fully charged with refrigerant and oil.
3. Headers shall be fully concealed inside the air-handling unit to eliminate air infiltration. The non-header end of the coil shall be fully concealed as well. Provide auxiliary drain pan piped to the main drain pan (no auxiliary connection required by installing contractor) for any coils above 42" high.
4. Refrigerant evaporator type coils shall be equipped with distributors connected to the coil by copper tubes. Where a hot gas bypass is required, the inlet shall be at the refrigerant distributor. Solenoid valves, expansion valves, and related accessories are to be provided and installed by the manufacturer.
5. 100% outside air refrigerant coil with four compressors shall be alternate tube circuited (Interlaced) in order to distribute the cooling effect over the entire coil face at reduced load conditions. Thermal expansion valves must be included for all applications. Twin Tandem sets of compressors may be used if listed in the schedule.
6. All refrigerant piping is to be hard copper.
7. Provide a stainless steel IAQ drain pan under the coil extending 14" past the coil to ensure condensate retention.
8. Drain pan must not be an integral part of the unit floor to prevent energy transfer and water leaks.
9. Cooling coil shall sit on top of cross supports above the cooling coil. Locating the coil in the drain pan will not be acceptable.

2.9 REFRIGERATION SYSTEM

A. Mechanical Cooling

1. Refrigerant: R-410a or R-134a shall be utilized for all mechanical cooling applications.
2. Compressors shall be hermetic scroll type and include the following items:
   a. Suction and discharge service valves.
   b. Reverse rotation protection.
   c. Oil level adjustment.
   d. Oil filter.
   e. Rotary dirt trap.
   f. Short cycling control.

g. High and low pressure limits.

h. Crankcase heaters.

i. Compressors shall be installed in an isolated. Microprocessor controller, non-fused disconnect, compressor relays, fan motor VFD, and all other electrical components inside the unit.

B. Air Cooled Condenser

1. Condenser coils shall be copper tube type, mechanically expanded into aluminum fins. The complete coil core is tested to 700 pounds air pressure under warm water and guaranteed for 500 psig working pressure.

2. Provide condenser coil hail guards over each condenser coil.

3. Condenser fans shall be direct driven propeller type arranged for vertical draw through airflow. Motors shall be weather resistant TEFC type, with integral overload protection and designed for vertical shaft condenser fan applications rated at 1180 rpm, maximum (3600rpm fans not allowed for noise reasons). All condenser fan blades to be of the four blade design. Fan and motor assemblies shall be mounted on a formed orifice plate for optimum efficiency with minimum noise level.

4. All Condenser fans to be provided with variable frequency drives to modulate condenser air flow based on head pressure.

5. Condenser rated for use in 105degF ambient.

6. Built in Condenser is to be an integral part of the unit. Skid mounted condensing units are specifically not acceptable.

C. Controls

1. Controls for hermetic compressor units shall include compressor contactors, control circuit transformer, cooling relays, non-recycling pump-down relays, ambient compressor lockout, manual reset high pressure controls and automatic reset low pressure controls. Variable frequency drives shall be included with each refrigeration circuit to modulate condenser airflow and efficiently maintain the required head pressure control.

2. Provide anti-cycle timers.

3. Provide inter-stage time delay timers.

4. Provide hot gas bypass on the lead compressor.

5. Cooling Control

a. Electronic: DDC temperature control system to maintain discharge air temperature off of DX coil. The minimum run and off time for compressors shall be 3 minutes.

b. The DDC temperature control system shall be capable of interfacing with the front-end building management system via BACnet communication.

D. Unit Controls

1. Provide stand-alone programmable digital control system. Carel brand DDC controller with hand-held interface keypad for maintenance purposes.

a. Cooling mode

b. Heating mode

c. Air volume control based on signal from BACnet controller

d. The controller shall have communication capability for BACnet MS/TP. The controller is to be factory programmed and must control the cooling, heating and all sequences

of operation of the units such as Occupied/Unoccupied and night set back functions. Carel controller must interface seamlessly with Building Management System (BMS).

2. Factory installed sensors: (Minimum)
   a. Outside air dry bulb temperature & humidity
   b. Heating discharge dry bulb temperature
   c. DX coil leaving air dry bulb temperature and humidity
   d. Supply air fan status (airflow sensor)
   e. Compressor run status (current sensing donuts)
   f. Dirty filter indication (pressure differential)
   g. Coordinate with BMS contractor on specific type of space sensors to be used to insure compatibility.
   h. Reference point list in BMS section for required minimum read and read/write

2.10 OUTDOOR AIR SECTION

A. Provide outside air dampers with actuators.

B. Provide adjustable minimum position control through the standard rooftop Human Interface.

C. Provide spring-return motor for outside air damper closure during unit shutdown or power interruption.

2.11 DAMPERS

A. Provide low leak dampers with a leakage rate not to exceed 2.5% of nominal airflow at one inch W.C. static pressure.

B. Leakage rate shall be determined in accordance with AMCA Standard 575.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that roof is ready to receive work and opening dimensions are as indicated on shop drawings.

B. Verify that proper power supply is available.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Mount units on factory built roof mounting frame providing watertight enclosure to protect ductwork. Install roof mounting curb level.

3.3 MANUFACTURER'S FIELD SERVICES

A. Manufacturer shall furnish a factory trained service engineer without additional charge to assist the installing contractor with start up of the units.

B. Include at least 4 hrs per units for start up, check out and logging. Furnish log of operating pressures and temperatures to the installing contractor for owner’s manuals.

C. Provide two 4 hour sessions of training for Owner-operator personnel. Training shall include all phases of normal operations, routine maintenance, trouble shooting and minor repair items.

D. Package rooftop unitary manufacturers shall maintain service capabilities no more than 50 miles from the jobsite.

E. The manufacturer shall furnish complete submittal wiring diagrams of the package unit as applicable for field maintenance and service.

END OF SECTION

SECTION 23 81 27

DUCTLESS SPLIT SYSTEM HEAT PUMP AIR CONDITIONING UNITS

PART 1 - GENERAL

1.1 SCOPE

A. Provide and install split system heat pump air conditioning systems with fan coil evaporator units as described on the drawings and as specified herein.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's product data, including rated capacities, weights, furnished specialties and accessories and installation and start-up instructions.

B. Drawings: Submit manufacturer's drawings indicating dimensions, required clearances, and refrigeration component balance diagram.

C. Wiring Diagrams: Submit ladder-type wiring diagrams for power and control wiring. Differentiate between portions of wiring that are factory-installed and portions to be field-installed.

D. Maintenance Data: Submit maintenance data and parts list for each condensing unit, control, and accessory.

1.3 STORAGE AND HANDLING

A. Handle condensing units carefully to prevent damage, denting and scoring. Do not install damaged condensing units or components; replace with new.

B. Store condensing units and components in a clean dry place. Protect from weather, dirt, water, and construction debris.

C. Do not allow condensing units or evaporators to be used as work tables during construction.

1.4 Warranty

A. Full parts and labor warranty with no exclusions other than filter changes for 5 years from date of substantial completion

B. The compressors shall carry one additional year of parts only warranty above the basic warranty period.

PART 2 - PRODUCTS

2.1 GENERAL

A. All major components, shall be from the same manufacturer:
1. Mitsubishi
2. EMI
3. Friedrich
4. Carrier
5. LG
6. Daikin

7. Pre-approved similar and equivalent manufacturers

B. Components shall have been tested as a system and shall have approved combination ratings.

C. System(s) shall be provided with all normal components, whether specifically mentioned or scheduled, to provide a safe and fully operational system.

D. System shall use refrigerant R-410A.

2.2 FAN-COIL UNITS

A. Each fan-coil unit shall be completely compatible with the variable refrigerant system and shall be capable of independent heating or cooling mode regardless of the mode of the other units.

B. Each unit shall be equipped with an integral condensate receiver and drain with adequate lift to pump the condensate to a remote drain.

C. Blower and Drive: Blower shall be forward curved, centrifugal type, statically and dynamically balanced at the factory. Blower motor shall be variable speed, direct drive type and shall be resiliently mounted.

D. Coil: Coil shall have aluminum fins fitted to copper tubes. Joints shall be brazed or silver soldered to be leakproof. Coil shall be factory tested under pressure to ensure leakproof construction. Coil shall have corrosion proof drain pan with drain fittings. Coil shall have brazed refrigerant connections.

E. Provide integral condensate pump where unit cannot gravity drain into a drainage fixture.

2.3 OUTDOOR UNIT

A. Each unit shall come from factory complete with compressor(s), fan(s) and motor(s), outdoor coil, refrigerant circuits, and control panel, all enclosed in a casing with a grille or louver for condenser coil protection.

B. Casing shall be galvanized steel with a weather resistant finish. Access panels shall be provided for power, refrigerant circuits, and outdoor fans and coils. Refrigerant circuit stubs shall extend through cabinet for easy connection.

C. Each compressor shall be hermetically sealed scroll type, internally isolated, with crankcase heater, motor overload protection, and positive lubrication. Compressors shall be resiliently mounted and be provided with crankcase heaters.

D. Coil(s) shall be seamless copper or aluminum tubes with mechanically bonded aluminum fins. Each coil shall be factory tested at 450 psig under water and thoroughly dehydrated prior to assembling into unit. Provide hail guard for outdoor coils.

E. Accessories shall include an anti-cycle timer to prevent compressor short cycling, fan relay, liquid line filter dryer, lug adapter kit for single point connection, and any options or other accessories scheduled on the drawings.

2.4 CONTROLS

A. For each fan-coil unit, provide a programmable space thermostat.

2.5 REFRIGERANT PIPING

A. Materials – type ‘K’ hard drawn copper with wrought copper brazed fittings.

B. Insulate all refrigerant lines as recommended by the equipment manufacturer with Armaflex type piping insulation.

C. Sizing - Equipment manufacturer shall review refrigerant pipe routing and shall be responsible for correct refrigerant line sizing.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Outdoor Unit
1. Install outdoor unit on level reinforced concrete pads where installed on grade. Ensure that each unit is level after installation.
2. Install each outdoor unit on a minimum of four 3/8" thick neoprene pads, one at each corner.

B. Evaporator Blower
1. Install each unit per manufacturer's instructions and/or as shown on drawings.
2. Install each unit level.
   a. Install units to be suspended from structure with a rubber-in-shear vibration isolator at each threaded rod hanger.
3. Remove all shipping blocks and restraints.
4. Block off or cap or otherwise seal openings in the cabinet to prevent entry of dirt and debris until connections are made.
5. Open access panels and inspect unit for any abnormalities,
6. Make connection to primary drain connection at the drain pan and route to floor drain.
7. Make duct connections using flexible connectors. Verify that duct is independently and adequately supported.
8. Route condensate drainage to a drainage fixture or as shown on the drawings.

C. Filters :
1. If units are to be run during construction, install clean filters and change periodically.
2. Before start-up, provide and install clean filter(s).
3. Before acceptance by Owner, provide and install clean filter(s) and also provide to the Owner at least one clean filter of each size for each evaporator blower.

D. Clean the exterior of each unit to remove dirt, debris, etc.

3.2 REFRIGERANT PIPING

A. Test refrigeration system in accordance with A.S.M.E. B31.5.

B. Testing pressure shall not exceed maximum rating of weakest component of system. Hold test pressure for 72 hours prior to changing.
1. Place an initial charge of refrigerant in system for detection purposes.
2. Use dry nitrogen gas for pressure testing.

C. Check all joints with an electronic leak detector.

D. Cut out any joints found to be leaky and replace with new material.

E. After complete system is tested, disconnect suction and discharge lines from compressor for cleanup.

F. Valve or blank off system into two separate systems for purpose of cleanup.
1. Suction side including cooling coils.
2. Discharge side including air cooled condenser.

G. Thoroughly clean each system using pumped refrigerant until system is proven clean to satisfaction of refrigeration compressor serviceman.

H. After testing and cleaning have been completed and system proved tight, charge each circuit with dry clean refrigerant to approximately 50 psig of gas pressure.

I. Evacuate to 100 micron Hg and hold for 48 hours. Apply heat to pockets, traps, elbows and low spots.

J. Admit another drying charge of refrigerant and allow 4 to 6 hours to absorb moisture and install dryer cores.

K. Use second evacuation to remove all refrigerant and moisture.

L. After second evacuation, charge system with refrigerant.

M. Add refrigerant to system as required after final evacuation.

3.3 CHECK-OUT: After complete installation but before start-up, verify the following:

A. Unit properly installed and level,

B. Interior of each section is clean and free of debris, dirt, loose components, etc.,

C. Correct voltage supplied,

D. Correct size wire, fuses, and breakers are installed,

E. Low voltage wiring correct and complete,

F. Refrigerant lines properly installed and supported.

G. Condensate drain lines correctly pitched and unrestricted,

H. Blower rotates freely and set on correct speed,

I. Clean air filter properly installed,

J. All shipping blocks, packing, shipping screws, etc. are removed.

K. All access panels and covers in place and properly secured, and

L. Thermostat set in the "off" position.

3.4 START-UP

A. Supply initial charge of refrigerant and oil.

B. Before start-up, inspect the interior of each section to verify that it is clean and free of debris, dirt, loose components, etc.. Do not attempt to start-up a dirty unit.

C. Supply service of factory-trained representative to supervise testing, dehydration, charging of units, and start-up. Authorized start-up technician shall prepare and provide a start-up report for each split system.

D. Provide start-up services per manufacturer's instructions. Provide a start-up report for each heating/cooling unit including refrigerant system, heating system, and air system. At a minimum, the start-up report shall include the following information.

1. Air Moving System - Refer to section on system test and balance,
2. Refrigerant System - refrigerant charge, in pounds,
3. Heating System
   a. ambient dry bulb temperature,
   b. air temperatures at indoor unit,
   c. entering air dry bulb,
   d. leaving air dry bulb,
   e. voltage,
   f. amperage of each leg.
4. Cooling System

a. ambient dry bulb temperature,
b. air temperatures at indoor unit,
c. entering air dry bulb and wet bulb,
d. leaving air dry bulb and wet bulb,
e. refrigerant suction line temperature
f. at the evaporator coil,
g. at the condenser coil,
h. suction and liquid refrigerant pressure at condensing coil,
i. applied voltage and running load amps, per phase, at outdoor unit.

END OF SECTION

SECTION 26 01 00

GENERAL REQUIREMENTS FOR ELECTRICAL WORK

PART 1 - GENERAL

1.1 SCOPE

A. This project involves construction of the project as titled above with associated site work as shown on the plans and described herein.

1.2 DRAWINGS

A. Contract drawings are diagrammatic only and do not give fully dimensioned locations of various elements. Contractor shall determine exact locations from field measurements. Refer also to all architectural, structural, etc., drawings. The lack of specific detail of all offsets, transitions, etc., shall not relieve the Contractor of responsibility to provide such necessary elements to coordinate his work with building construction and with other trades.

1.3 SUBSTITUTION

A. All bids shall be based only on the equipment and materials as scheduled on the drawings and/or as specified, or on equivalent equipment and materials from a pre-approved alternative manufacturer. No bids may be based on a substitute or other alternative without specific written prior approval from the Engineer. Any Bidder who assumes equivalence of products and who bases his/her bid on that assumption, does so at their own risk.

B. A listing of approved alternative manufacturers does not mean that all products of a particular alternative manufacturer are acceptable alternatives to the scheduled items; it merely means that for bidding prior approval is not required. All fixtures and devices must still be submitted according to the prescribed procedures. In addition, some items that have an important visual affect, e.g. electric water coolers, may be required to receive Engineer's or Owner's approval also.

C. Substitute equipment, components, devices and systems shall be fully compatible with the design intent and complete with all required costs included in the bid amount. This includes all modifications to support, structure, pipe and electrical sizing and components needed and all other items necessary for the substitute to perform with no additional cost to the project.

1.4 INTENT

A. All equipment, materials and labor that may be necessary to complete work in accordance with the intent of these plans and specifications shall be furnished by the Contractor without additional cost.

B. All systems represented in the documents shall, unless specifically noted to the contrary, be provided and installed complete with all necessary components to form a complete and functioning system. Submission of bids will be considered confirmation that complete and functional systems have been included in the bids.

C. If any discrepancies or confusion is perceived in the documents, the Contractor shall call such to the attention of the Engineer for clarification of the documents prior to bidding or construction. If any inconsistencies or contradictions within the construction documents are discovered after the construction contracts are awarded, the Engineer shall determine the intent and correct interpretation of the construction documents.

D. Contractor shall supervise and direct the work competently and efficiently and in accordance with the drawings and specifications. Contractor shall be responsible for using construction means, methods, techniques, sequences, and procedures as are compatible with the project's requirements and will result in a project completed in accordance with the requirements of the drawings and specifications.

1.5 CODES, PERMITS AND FEES

A. Contractor shall comply with all local, state and national codes and shall pay for all applicable costs, fees and permits.

1.6 CONNECTION TO UTILITIES

A. Coordinate connections to utilities directly with utility providers.

B. Verify location, size, elevation, pressure, and any other pertinent data of existing utilities. Additional costs incurred due to a failure to verify such data and to coordinate associated work with respective utility providers shall be borne by Contractor.

C. All costs associated with providing utilities including, but not limited to, connection fees, boring under roads, etc., shall be included in the Contractor's bid price whether such costs are incurred by Contractor or charged by a utility company.

D. Submission of a bid by a Contractor shall be considered an acknowledgment by the Contractor of his compliance with this section.

E. Contractor shall connect water and waste piping and gas service to existing services in accordance with utility company regulations and shall pay all applicable fees and costs. NOTE: Excavate by hand and with caution to locate all utilities prior to machine excavation. Should any service be interrupted, Contractor shall repair it immediately and at no cost to the Owner.

1.7 CONNECTION OF EQUIPMENT PROVIDED BY OTHERS

A. Provide material and labor to connect equipment, components and systems provided by the Owner or other trades.

B. Particular attention is required for food service and kitchen area equipment. Review Construction Documents describing work in those areas. Coordinate installation requirements and timing with system installers and providers.

1.8 VIBRATION AND NOISE

A. Each of the various pieces of equipment shall operate without objectionable vibration or noise. All rotating equipment shall be statically and dynamically balanced and shall be mounted, supported, and fastened so that vibration shall not exceed levels specified for the equipment item. The specific type of vibration isolation to be installed shall be submitted to the Engineer for his approval.

B. If, in the opinion of the Engineer, objectionable vibration or noise or transmission thereof to the building occurs, the Contractor shall execute remedial measures as may be necessary to eliminate such unsatisfactory operating conditions, and the work and material thereby required shall be furnished and performed at the Contractor's expense.

1.9 GUARANTEE

A. Each Contractor shall guarantee all labor and materials furnished by him for a period of one year unless otherwise noted. Guarantee period shall extend from the time of final written

acceptance of the installation or upon usage by a written directive from the Owner, whichever occurs first. The guarantee shall cover the repair or replacement, without additional cost to the Owner, of any defective material or faulty workmanship.

1.10 SERVICE

A. All necessary service of each system, such as adjustment of controls, air distribution, and water balancing valves, mechanical repair of equipment, 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.

1.11 SAFETY

A. General
   1. Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the work, and Contractor shall comply with all laws governing safety, specifically the "Occupational Safety and Health Standards" and the "Safety and Health Regulations for Construction", state and federal.

B. Hazardous Chemicals
   1. According to OSHA, a hazardous chemical is any chemical which is a physical hazard or a health hazard. This may include items such as paints, solvents, adhesives, sealants, cleaners, etc. If a contractor produces, uses, or stores hazardous chemicals at the workplace, then contractor shall develop, implement, and maintain a hazard communication program in compliance with latest OSHA requirements. In projects with multiple tenants in which the building is partially occupied during the project, contractor shall inform the building manager or owner, according to OSHA guidelines, of any hazardous chemicals being produced, stored, or used in the building so that other tenants may be notified. Contractor shall employ required methods of training, information, handling, ventilation, labeling, storing, disposal, and removal of hazardous chemicals.

1.12 COORDINATION

A. Each Contractor's bid shall include the necessary detail and interconnection work to coordinate his work with the work of other trades. Failure on the part of the Contractor to coordinate with all other trades resulting in interferences shall be sufficient reason to require the Contractor to replace or rebuild the work involved at no extra charge.

1.13 STORAGE OF MATERIALS

A. Each Contractor shall provide temporary storage facilities suitable for equipment stored at the job site. Storage facilities shall be rain-proof and lockable as required. Materials or equipment stored on site but not in a lockable, rain-proof storage facility shall be stored above ground or above slab. Contractor shall take necessary precautions to prevent entry of and/or damage from dirt, trash, water, or vermin. Equipment not properly stored and protected shall be, at the discretion of the Engineer, replaced at no cost to Owner. Roofs are not acceptable storage areas unless specifically allowed in writing by the Engineer.

PART 2 - PRODUCTS

2.1 SUBMITTALS

A. Provide submittal to the A/E within 45 days of commencement of the Contractor’s agreement with the Owner.

B. In addition, submit specific information on equipment, products, and principal materials specified. Indicate and provide names of manufacturers, catalog and model numbers, cut sheets, and such other supplementary information as necessary for evaluation. Include all items mentioned by model number and/or manufacturer's name in the specifications or on the drawings, including but not limited to the following:
   1. Electrical - Fixtures, panels, protective devices, wiring devices, switches, motor starters, transformers, conduit, and any other equipment or principal materials.

C. Prepare and submit large scale shop drawings (minimum ¼"= 1'-0") of the central mechanical room, central electrical room and each individual electrical room. These drawings shall show to scale the actual sizes of each piece of selected mechanical, plumbing and electrical equipment along with the required clearances for maintenance or removal/replacement. Provide bottom of pipe, duct, equipment or other such vertical obstructions. Provide sections where necessary and as requested by the Engineer for clarity to describe equipment heights, piping elevations and other such clearance issues. Drawings shall be prepared on maximum 30" X 42" sheets using AutoCad® 2004 format. Submit 6 copies of the drawing sheets and a compact disk with the drawing files.

D. Requirements for submittal
   1. Each submittal shall:
      a. bear a stamp or specific written indication that Contractor has reviewed and approved all submittals prior to submission to Engineer,
      b. have all information deleted by Contractor that pertains to the means and methods of construction or to the fabrication, assembly, installation, or erection process (approval by Engineer shall not extend to these areas unless specifically noted by Engineer),
      c. be clearly marked as to which specific piece of equipment is being submitted, by use of a permanent marker, stamp, etc., so as to distinguish it from other pieces of equipment that may occur on the same page,
      d. be clearly marked as to which available options are being submitted that are associated with a piece of equipment, and
      e. be complete with respect to quantities, dimensions, specific performance, materials, and similar data to enable Engineer to review the proposed equipment.
   2. Omission by Contractor of any of the above requirements for submittals will subject submittal to automatic rejection without review.
   3. Any submittals received by Engineer that were not requested shall be returned without review of any kind.

E. Substitutions
   1. In Addition, no substitution is allowable without Engineer's written approval ten days prior to bid due date (unless otherwise allowed by Engineer) unless the manufacturer is listed on the Drawings or in the specifications as being a pre-approved alternative manufacturer. Any submittal received without such written approval or prior approval is subject to unqualified rejection.
   2. Contractor's responsibility shall be to verify that submitted substitute equipment will fit in the space available. The Contractor's submittal for acceptance of the substitute shall include a written statement of whether or not such acceptance would require any subsequent or associated changes to the drawings or specifications. Any such changes shall be described in writing, briefly but completely.
   3. The Contractor shall be responsible for the cost of any such modifications due to substitution of materials or equipment for that which was specified or scheduled. The cost shall be complete, that is, it shall include the costs affect on any and all other trades.
   4. The Engineer may request shop drawings of mechanical rooms or systems of the substituted equipment.

F. Installation Instructions
   1. For certain products or systems as identified in subsequent specification sections, the Contractor shall, as required, provide copies of manufacturer's installation instructions

with the submittal. When required as such, the installation instructions are considered part of the submittal and their omission may result in automatic rejection of the submittal. Where more than one identical devices are scheduled, only one set of installation instructions needs to be submitted, e.g. if seven five-ton split system air conditioners are scheduled, only one five-ton unit installation instructions needs to be submitted. Similarly, if one set of installation instructions is identified by the manufacturer and on the instructions to be applicable to more than one type or size of devices, e.g. if one set of air conditioner instructions is good for three, four, and five-ton units, then only one instruction set is required for those devices.

2.2 MATERIALS

A. All materials shall be new and of the quality specified. Materials shall be free from defects. Where manufacturers' names are mentioned in these specifications or on the plans, it has been done in order to establish a standard of quality and construction.

B. Contractor will be responsible for transportation of his materials to and on the job, and will be responsible for the storage and protection of his materials and work until the final acceptance of the job. At the end of each work day, each Contractor is responsible for covering or protecting his work or materials that may be susceptible to damage even if such damage is the result of unforeseen causes, e.g. an overnight thunderstorm. Failure to do so will be sufficient cause for rejection of any item in question, and any such item shall be replaced at Contractor's expense.

C. Contractor shall verify that all pieces of equipment will fit through available openings in building and that all equipment can be installed without modification of building structure.

2.3 LABELING

A. Each device for which an independent testing authority has established a standard shall have affixed a label indicating its compliance and listing. Such independent testing authorities shall include, but not be limited to, the following:

A.D.C.	Air Diffusion Council
A.G.A.	American Gas Association
A.M.C.A.	Air Movement and Control Association
A.N.S.I.	American National Standards Institute
A.R.I.	Air-Conditioning and Refrigeration Institute
A.S.H.R.A.E.	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
A.S.M.E.	American Society of Mechanical Engineers
A.S.P.E.	American Society of Plumbing Engineers
A.S.S.E.	American Society of Sanitary Engineers
A.S.T.M.	American Society for Testing and Materials
A.W.W.A.	American Water Works Association
C.T.I.	Cooling Tower Institute
F.M.	Factory Mutual
I.A.P.M.O.	International Association of Plumbing and Mechanical Officials
I.C.B.O.	International Conference of Building Officials
M.S.S.	Manufacturers Standardization Society of the Valve and Fittings Industry
N.A.P.H.C.C.	National Association of Plumbing, Heating, Cooling Contractors
N.B.S.	National Bureau of Standards
N.E.B.B.	National Environmental Balancing Bureau
N.E.C.	National Electric Code
N.E.M.A.	National Electrical Manufacturers Association
N.F.P.A.	National Fire Protection Association
N.R.C.A.	National Roofing Contractors Association

N.S.F.	National Sanitation Foundation
P.D.I.	Plumbing and Drainage Institute
S.B.C.C.I.	Southern Building Code Congress International
S.M.A.C.N.A.	Sheet Metal and Air Conditioning Contractors' National Association
T.I.M.A.	Thermal Insulation Manufacturers Association
U.L.	Underwriters Laboratory

2.4 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Contractor shall prepare and provide four copies of operating and maintenance manuals. Contractor shall deliver these four bound sets to the Engineer for approval. Each manual shall be in a ring binder and shall be indexed with dividers for each section. Delivery of required documents is a condition of final acceptance.

B. Each manual shall contain at least the following:
   1. Certificates of acceptance from inspecting authorities,
   2. Waiver of all liens,
   3. For each piece of equipment:
      a. operating and safety instructions, service manuals, and parts lists applicable to each item of equipment furnished (Contractor shall clearly distinguish in the manual between information that pertains to the particular equipment and information which does not.),
      b. nameplate data and design parameters for equipment,
      c. name, phone number, and address of vendor, manufacturer's representative, and warrantee provider,
      d. start-up report, if applicable,
   4. copies of all shop drawings and as-built drawings (as-built drawings shall be on a reproducible vellum as produced by a Xerox or photographic process),
   5. copies of all approved submittals,
   6. warranties with start dates and end dates for each piece of equipment and/or for each system (warranties shall begin on date of substantial completion and acceptance by Owner),
   7. names, phone numbers and addresses of all subcontractors, vendors, manufacturer's representatives, and warrantee providers,
   8. certification letter from each Contractor that each system furnished and installed by that Contractor and/or Subcontractors is started-up, balanced, adjusted and checked for proper operation in accordance with the intent of the contract documents, and
   9. acceptance letter from each Contractor with blanks for date of acceptance and date of expiration of warranties and guarantees.

2.5 TAGGING

A. Equipment to be Tagged: Each major piece of equipment discussed in the specifications or scheduled on the drawings shall have affixed a tag showing the name or function of that piece. The list of equipment to receive tags shall include, but not be limited to, the following:
   1. panelboards, switchgear, transformers, starters, safety switches, contactors, etc., with designation from drawing and indicating function or device served (e.g. - Rm 101 lighting contactor, CHP-1, etc.),
   2. motor starters and contactors, indicating which devices are being controlled,
   3. any other major piece of equipment.
   4. Items which have no unique name, such as light fixtures need not have tags.

B. Tags
   1. Material - Tags shall be engraved plastic, brass, or anodized aluminum. Surface mounted tags shall have pressure sensitive adhesive backing. Tags for outdoor use shall be mounted with brass screws.

2. Lettering - Characters shall be minimum 1/4" in height and shall be of a contrasting color to the tag.
3. Installation - Surface mounted tags with adhesive backs shall be applied only to clean, dry surfaces. Adhesive tags shall not be applied to surfaces that are subject to condensation or excessive heat.

C. Alternatives
1. For larger equipment such as large air handlers, switchgear, etc., the use of manufactured stencils (2 inch characters) and spray paint (in contrasting color to equipment) is an acceptable alternative.
2. Individual adhesive letters are not acceptable.
3. Other alternatives are acceptable only by submitting samples or manufacturer's literature to Engineer and receiving written permission.

2.6 MOTORS AND MOTOR STARTERS

A. Motors
1. Unless scheduled otherwise, each electric motor shall be high efficiency type.
2. Each single phase motor larger than 1/10 (one-tenth) horsepower and each single phase motor that drives a pump or compressor shall be a permanent split capacitor type. Each polyphase squirrel-cage induction motor shall be an energy efficient type as defined in NEMA document No. MG1-1987.

B. Motor Connections
1. Motor starters, unless scheduled otherwise or packaged with the equipment shall be provided and installed by the Electrical Contractor. The Mechanical Contractor shall provide to the Electrical Contractor a complete list of motors requiring starters or other connections, including power and control, and shall include the following information for each such motor:
a. a tag reference to the piece of equipment for which the motor is needed,
b. the voltage and number of phases,
c. the motor requirements in terms of horsepower, running load amps, full load amps, etc.,
d. any other pertinent information required or requested by the Electrical Contractor.
2. The Electrical Contractor shall receive and review the above information and advise the Mechanical Contractor and Engineer of any discrepancies or required modifications. The Electrical Contractor shall provide and install the correct starter, conductors, and other devices per the electrical drawings, specifications, and National Electrical Code.

PART 3 - EXECUTION

3.1 WORKMANSHIP

A. The workmanship shall, in all respects, be of the highest grade, and all construction shall be done according to the best practices of the trade. Piping, ducting and conduit shall be concealed unless otherwise noted, and installed square to the building lines. Any work not meeting this requirement shall be replaced or rebuilt without extra expense to the Owner.

3.2 INTERIM CLEANING

A. The Contractor shall maintain the work area in a clean condition during the course of the work. All debris, scrap and surplus material shall be removed from the work area on a periodic basis with a minimum of at least once per day.

B. All stored material shall be support above floor level and be protected from becoming damaged or dirty.

C. All installed material shall have open ends closed and protected from entrance of foreign material during construction.

D. Prior to enclosing an area such as a ceiling or chase wall, the installed material and surrounding area shall be thoroughly cleaned. After removing loose material, the area shall be vacuum cleaned or blown out with a portable blower to remove dust from surfaces.

3.3 CUTTING, PATCHING, AND PENETRATIONS

A. No joists, beams, girders, columns, slabs, or other structural elements shall be cut, drilled, or altered in any way by the Contractor without first obtaining written permission and instructions from the Engineer.

B. Where cutting any non-structural element(s) of walls, floors or ceilings is necessary to permit the installation of any work under this contract, or to repair any defects that may appear up to the expiration of the guarantee, such cutting shall be done by Contractor with as little damage as reasonably possible to the element being cut, to adjacent elements, or to the work of other trades.

C. After the necessary work has been completed, the damage shall be repaired by the Contractor, who shall pay all costs of such cutting and patching. All patching or sealing of cuts, penetrations, etc., including final appearance of same, shall be done to the approval of the Engineer. In absence of specific finish instructions, provide finish to match adjacent surfaces.

D. Where a penetration or cutting of a ceiling, wall, or other building membrane is required or made, each such penetration or cut shall be made neatly with a cutting tool such as a saw, sharp knife, etc., and not with an impact tool such as a hammer, screwdriver, wrench, crowbar, etc. Each such penetration or cut shall be no larger than reasonably necessary, and penetrations in occupied or publicly accessible spaces shall have a chrome-plated escutcheon installed large enough to cover the entire opening.

E. Where a penetration is made in a fire-rated building assembly (wall, floor, ceiling, floor-ceiling, roof-ceiling, etc.) or in a membrane of a fire-rated assembly, and no specific firestopping assembly is shown on Drawings, Contractor shall provide and install a firestopping assembly or product as listed in the latest edition of U.L. Fire Resistance Directory. Firestopping assembly or product shall be appropriate for the size and material of the penetrating element, for the penetrated building element, for the presence or lack of insulation, for the size of the annulus around the penetrating element, etc. Contractor shall include firestopping assembly or product in submittals. Contractor shall review and verify fire-ratings of building assemblies as shown on Architectural plans. Lack of knowledge of a fire-rating of an building assembly shall not relieve Contractor of requirement to install firestopping.

3.4 EQUIPMENT AND PIPING SUPPORTS

A. All supporting systems for piping, equipment, and materials supported by the building structure shall be submitted to the Engineer for approval prior to purchase and installation.

B. Provide 3-1/2” (minimum, or as called out elsewhere) high concrete house keeping pads for all floor mounted equipment piping. Pad shall have chamfered edges and be painted to match the floor.

3.5 ACCESSIBILITY

A. Access Panels

1. Access panels shall be provided wherever necessary for possible future replacement, adjustment, or maintenance of operating devices such as machinery, valves, dampers, switches, relays, etc., or to other critical non-operating devices such as pull boxes, inspection parts, gauges, etc. Such access panels shall be provided and installed by Contractor, whether or not shown on drawings, and shall be brought to the attention of Engineer for his approval of type, color, etc. Where access is provided in rated members, the access panels shall be of a type that maintains the integrity of the member penetrated.

B. Access to Equipment
1. All pipes, tubing, conduit, etc., including, but not limited to, chilled water and heating water piping, domestic cold water and hot water piping, fire sprinkler piping, waste and vent piping, drain piping of any type, electrical conduit, wiring not in conduit, and pneumatic control tubing shall be installed in such a way so as not to prevent and/or not to make unreasonably difficult the removal, operation, use, or maintenance of equipment, access panels or doors, pathways (especially in attics or crawl spaces), observation ports, measurement or balancing devices, junction boxes, etc.. If access for these purposes is prevented or made unreasonably difficult in the opinion of the Engineer, then the Contractor shall make modifications or repairs at no cost to anyone except the Contractor. Such modifications or repairs shall be considered neither complete nor adequate until the Engineer are satisfied that access for the above purposes is achieved.

3.6 FIELD REPORTS

A. The Contractor shall be required to respond all deficiency items noted in Field, Site Visit, Punch List and other such reports provided by the A/E. The response shall address each deficiency item in the same order as the report with annotations as to what was done to remedy the deficiency, who performed the work and when it was done.

3.7 OPERATING TESTS

A. General
1. After all mechanical and electrical systems have been completed and put into operation, Contractor shall subject each system to an operating test under design conditions to ensure proper sequence and operation throughout the range of operation. All associated costs of such tests, including labor, fuel, apparatuses, piping, etc., shall be borne by the Contractor.
2. Contractor shall make adjustments as required to ensure proper functioning of all systems. Special tests on individual systems are specified under individual sections. The Contractor shall return to the project during the first year and in the opposite season from which the system was initially operated and shall check the proper operation of the mechanical and electrical systems. Contractor shall perform any adjustments or corrective procedures required for the proper operation of all systems.

B. Notification
1. Contractor shall give the Engineer seven day’s prior notification of any test so that the Engineer will have time to be present if he so desires.

C. Reports
1. After each test is performed, the Contractor who performed the test shall prepare and issue a report to include the following information:

a. Project name and location, date of the report,
b. Contractor's name, address, and telephone number; if the Contractor performing the test is a Subcontractor, indicate also for whom the test is being performed, their name, address, telephone number, and a contact person's name,
c. the date, or range of dates, of the test,

d. the name of the Contractor's employee who was responsible for performing or for overseeing the performing of the test,
e. a brief description of the system being tested,
f. a brief description of the testing procedure,
g. a summary of the test result(s),
h. a brief assertion that the system was tested as stated and that the system complied with the requirements of the contract documents or those of the Authority Having Jurisdiction, whichever is the most stringent, and
i. a hand-written date and signature of someone who has authority or responsibility from the company that performed test(s), and a hand-written brief note stating that the above information is true and accurate.

2. If the tested system is tested in parts, then one report may be made after the last part is tested.
3. The report shall be issued to the Engineer within five working days after the test is completed.
4. Such reports shall be required of all mechanical or electrical systems which require tests for pressure, water tightness, flow, resistance, or conductivity.

D. Services of a Manufacturer's Representative
1. Reports: For all major systems or equipment required by subsequent specifications sections to have tests or inspections by a manufacturer's representative, the manufacturer's representative shall prepare a written report to be sent to the Engineer for subsequent distribution to the Engineer, Owner, General Contractor, and to whomever else the Engineer deems necessary. The report shall include at least the following:
a. date of the visit, name and title of the representative, name and location of the project,
b. name and title of any observers,
c. a brief description of the equipment being inspected and/or tested,
d. a brief discussion of the quality of the installation including any important items (in the manufacturer's experience) that were done correctly, as well as any items that were done incorrectly or not to recommendations,
e. a list of tests and/or inspections performed and the results of same, and
f. a brief statement of whether the installation conforms to manufacturer's recommendations and/or requirements, and if not what is required to bring the installation into conformance.
2. Deficiencies and Defects
a. Contractor shall be responsible for providing all labor and materials, at no cost to anyone except Contractor, to correct any deficiencies or defects reported by manufacturer's representative.
b. If, in the opinion of the manufacturer's representative, the deficiencies and defects are sufficiently serious, then Contractor shall arrange for, and bear all costs of, another inspection by manufacturer's representative after corrective measures have been taken.
3. The above process shall continue until the manufacturer's representative approves the installation.

3.8 INSTRUCTIONS FOR OWNER

A. Contractor shall instruct the Owner's operating personnel in the operation and maintenance of all mechanical equipment. Contractor shall furnish any special servicing tools required for maintenance.

3.9 DEMONSTRATION

A. Contractor shall conduct a demonstration of the installation upon completion of the work. Prior to this, all work shall have been completed, tested, balanced, and placed in operation.

Qualified persons must be present at demonstration to operate all systems and prove the performance of the equipment. The schedule for this demonstration shall be coordinated with the Engineer.

3.10 CLEANUP

A. At substantial completion of the project, thoroughly clean all equipment and systems of all dirt, debris and foreign material.

B. This shall include cleaning coils and fans inside of air handlers, cleaning the interior of duct systems and wiping down the interior of all electrical equipment.

C. Remove all unused temporary wiring or construction lighting and power and all unused material from above the ceilings and from hidden recesses.

END OF SECTION

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes building wire and cable; nonmetallic-sheathed cable; direct burial cable; service entrance cable; armored cable; metal clad cable; and wiring connectors and connections.

B. Related Sections:
1. Section 26 05 53 - Identification for Electrical Systems: Product requirements for wire identification.

1.2 REFERENCES

A. International Electrical Testing Association:
1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.3 SYSTEM DESCRIPTION

A. Product Requirements: Provide products as follows:
1. Solid copper conductor for feeders and branch circuits 12 AWG and smaller.
2. Stranded copper conductors for control circuits.
3. Stranded copper conductors larger than 12 AWG.
4. Conductor not smaller than 12 AWG for power and lighting circuits.
5. Conductor not smaller than 16 AWG for control circuits.
6. 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.
7. 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet.

B. Wiring Methods: Provide the following wiring methods:
1. Concealed Dry Interior Locations: Use only building wire THHN/THWN insulation, in raceway.
2. Concealed Dry Interior Locations: For lighting whips and drops to single outlet or switch and within wall cavities THHN/THWN insulation with grounding strip for exterior of metal clad cable and green insulated ground wire complying with NEC requirements may be used at contractor’s option
3. Exposed Dry Interior Locations: Use only building wire THHN/THWN insulation, in raceway.
4. Wet or Damp Interior Locations: Use only building wire THHN/THWN insulation, in raceway.
5. Exterior Locations: Use only building wire THHN/THWN insulation, in raceway.
6. Underground Locations: Use only building wire THHN/THWN insulation, in raceway.

1.4 SUBMITTALS

A. Section 26 01 00 - Submittal Procedures: Requirements for submittals.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of components and circuits.

1.6 FIELD MEASUREMENTS

A. Verify field measurements are as indicated on Drawings.

1.7 COORDINATION

A. Where wire and cable destination is indicated and routing is not shown, determine routing and lengths required.

B. Wire, conduit and cable routing indicated is approximate unless dimensioned. Include wire and cable lengths within 10 ft of length shown.

PART 2 - PRODUCTS

2.1 BUILDING WIRE

A. Product Description: Single conductor insulated wire.

B. Conductor: Copper.

C. Insulation: 600 volt rating; thermoplastic material rated 90 degrees C.

2.2 METAL CLAD CABLE

A. Conductor: Copper.

B. Insulation Voltage Rating: 600 volts.

C. Insulation Temperature Rating: 90 degrees C.

D. Insulation Material: Thermoplastic.

E. Insulated green grounding conductor.

F. Armor Design: Interlocked metal tape.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify interior of building has been protected from weather.

B. Verify mechanical work likely to damage wire and cable has been completed.

C. Verify raceway installation is complete and supported.

3.2 PREPARATION

A. Completely and thoroughly swab raceway before installing wire.

3.3 INSTALLATION

A. Route wire and cable to meet Project conditions.

B. Neatly train and lace wiring inside boxes, equipment, and panelboards.

C. Identify and color code wire and cable under provisions of Section 26 05 53. Identify each conductor with its circuit number or other designation indicated.

D. Special Techniques--Building Wire in Raceway:
1. Pull conductors into raceway at same time.
2. Install building wire 4 AWG and larger with pulling equipment.

E. Special Techniques - Cable:
1. Protect exposed cable from damage.
2. Support cables above accessible ceiling, using spring metal clips to support cables from structure or ceiling suspension system. Do not rest cable on ceiling panels.
3. Use suitable cable fittings and connectors.

F. Special Techniques - Wiring Connections:
1. Clean conductor surfaces before installing lugs and connectors.
2. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
3. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.
4. Install split bolt connectors for copper conductor splices and taps, 6 AWG and larger.
5. Install solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
6. Install insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

G. Install solid conductor for feeders and branch circuits 12 AWG and smaller.

H. Install stranded conductors for branch circuits 10 AWG and larger. However, when stranded conductors are used in lieu of solid, then install crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under screws.

3.4 WIRE COLOR

A. General
1. For wire sizes 10 AWG and smaller, install wire colors in accordance with the following – unless governed by other local code amendments:
   a. Black and red for single phase circuits at 120/240 volts.
   b. Black, red and blue for circuits at 120/208 volts single or three phase.
   c. Purple, brown, and yellow for circuits at 277/480 volts single or three phase.
2. For wire sizes 8 AWG and larger, identify wire with colored tape at terminals, splices and boxes. Colors are as follows:

a. Black and red for single phase circuits at 120/240 volts.
b. Black, red, and blue for circuits at 120/208 volts single or three phase.
c. Purple, brown, and yellow for circuits at 277/480 volts single or three phase.

3. If there is a local code stating wire color, the local code shall supersede.

B. Neutral Conductors: White 120/208 volts, neutral gray 277/480 volts. When two or more neutrals are located in one conduit, individually identify each with proper circuit number.

C. Branch Circuit Conductors: Install three or four wire home runs with each phase uniquely color coded.

D. Feeder Circuit Conductors: Uniquely color code each phase.

E. Ground Conductors:
1. For 6 AWG and smaller: Green.
2. For 4 AWG and larger: Identify with green tape at both ends and visible points including junction boxes.

END OF SECTION

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Rod electrodes.
2. Wire.
3. Mechanical connectors.
4. Exothermic connections.

1.2 REFERENCES

A. Institute of Electrical and Electronics Engineers:
1. IEEE 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
2. IEEE 1100 - Recommended Practice for Powering and Grounding Electronic Equipment.

B. International Electrical Testing Association:
1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

C. National Fire Protection Association:
1. NFPA 70 - National Electrical Code.
2. NFPA 99 - Standard for Health Care Facilities.

D. Underwriters Laboratories
1. UL 467 – Grounding and Bonding of Equipment
2. UL 50 – Standard for Safety for Enclosures for Electrical Equipment (CYIV and BGUZ)

1.3 SYSTEM DESCRIPTION

A. Grounding systems use the following elements as grounding electrodes:
1. Metal underground water pipe.
2. Metal building frame.
3. Concrete-encased electrode.
4. Metal underground gas piping system.
5. Rod electrode.

1.4 PERFORMANCE REQUIREMENTS

A. Grounding System Resistance: 5 ohms maximum.

1.5 SUBMITTALS

A. Product Data: Submit data on grounding electrodes and connections.

B. Test Reports: Indicate overall resistance to ground.

1.6 CLOSEOUT SUBMITTALS

A. Section 01 77 00 - Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record actual locations of components and grounding electrodes.

1.7 QUALITY ASSURANCE

A. Provide grounding materials conforming to requirements of NEC, IEEE 142, and UL labeled.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

D. Do not deliver items to project before time of installation. Limit shipment of bulk and multiple-use materials to quantities needed for immediate installation.

1.9 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

B. Complete grounding and bonding of building reinforcing steel prior concrete placement.

PART 2 - PRODUCTS

2.1 ROD ELECTRODES

A. Product Description:
1. Material: Copper-clad steel or Copper.
2. Diameter: 3/4 inch.
3. Length: 10 feet.

B. Connector: Connector for exothermic welded connection.

2.2 WIRE

A. Material: Stranded copper.

B. Foundation Electrodes: 4 AWG.

C. Grounding Electrode Conductor: Copper conductor insulated.

D. Bonding Conductor: Copper conductor insulated.

2.3 MECHANICAL CONNECTORS

A. Description: Bronze connectors, suitable for grounding and bonding applications, in configurations required for particular installation.

2.4 EXOTHERMIC CONNECTIONS

A. Product Description: Exothermic materials, accessories, and tools for preparing and making permanent field connections between grounding system components.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify final backfill and compaction has been completed before driving rod electrodes.

3.2 PREPARATION

A. Remove paint, rust, mill oils, and surface contaminants at connection points.

3.3 INSTALLATION

A. Install in accordance with IEEE 142 and 1100.

B. Install additional rod electrodes to achieve specified resistance to ground.

C. Install grounding and bonding conductors concealed from view.

D. Install grounding electrode conductor and connect to reinforcing steel in foundation footing.

E. Bond together metal siding not attached to grounded structure; bond to ground.

F. Install isolated grounding conductor for circuits supplying circuits shown on the drawings in accordance with IEEE 1100.

G. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

H. Permanently ground entire light and power system in accordance with NEC, including service equipment, distribution panels, lighting panelboards, switch and starter enclosures, motor frames, grounding type receptacles, and other exposed non-current carrying metal parts of electrical equipment.

I. Install branch circuits feeding isolated ground receptacles with separate insulated grounding conductor, connected only at isolated ground receptacle, ground terminals, and at ground bus of serving panel.

J. Accomplish grounding of electrical system by using insulated grounding conductor installed with feeders and branch circuit conductors in conduits. Size grounding conductors in accordance with NEC. Install from grounding bus of serving panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes or metal enclosures of service equipment. Ground conduits by means of grounding bushings on terminations at panelboards with installed number 12 conductor to grounding bus.

K. Grounding electrical system using continuous metal raceway system enclosing circuit conductors in accordance with NEC.

L. Permanently attach equipment and grounding conductors prior to energizing equipment.

3.4 FIELD QUALITY CONTROL

A. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

END OF SECTION

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Conduit supports.
2. Formed steel channel.
3. Spring steel clips.
4. Firestopping relating to electrical work.
5. Firestopping accessories.
6. Equipment bases and supports.

1.2 REFERENCES

A. ASTM International:
1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
3. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
4. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.

B. FM Global:
1. FM - Approval Guide, A Guide to Equipment, Materials & Services Approved By Factory Mutual Research For Property Conservation.

C. National Fire Protection Association:
1. NFPA 70 - National Electrical Code.

D. Underwriters Laboratories Inc.:
1. UL 263 - Fire Tests of Building Construction and Materials.
2. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
3. UL 1479 - Fire Tests of Through-Penetration Firestops.
4. UL 2079 - Tests for Fire Resistance of Building Joint Systems.
5. UL - Fire Resistance Directory.

E. Intertek Testing Services (Warnock Hersey Listed):
1. WH - Certification Listings.

1.3 DEFINITIONS

A. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

1.4 SUBMITTALS

A. Shop Drawings: Indicate system layout with location and detail of trapeze hangers.

B. Product Data:
1. Hangers and Supports: Submit manufacturers catalog data including load capacity.
2. Firestopping: Submit data on product characteristics, performance and limitation criteria.

C. Firestopping Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.

D. Design Data: Indicate load carrying capacity of trapeze hangers.

E. Manufacturer's Installation Instructions:
1. Hangers and Supports: Submit special procedures and assembly of components.
2. Firestopping: Submit preparation and installation instructions.

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

G. Engineering Judgments: For conditions not covered by UL or WH listed designs, submit judgments by licensed professional engineer suitable for presentation to authority having jurisdiction for acceptance as meeting code fire protection requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

B. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

PART 2 - PRODUCTS

2.1 CONDUIT SUPPORTS

A. Manufacturers:
1. Allied Tube & Conduit Corp.
2. Electroline Manufacturing Company
3. B-Line
4. Unistrut
5. Power Strut
6. Kindorf

B. Hanger Rods: Threaded high tensile strength galvanized carbon steel with free running threads. Minimum diameter 3/8 inch.

C. Beam Clamps: Malleable Iron, with tapered hole in base and back to accept either bolt or hanger rod. Set screw: hardened steel.

D. Conduit clamps for trapeze hangers: Galvanized steel, notched to fit trapeze with single bolt to tighten.

E. Conduit clamps - general purpose: One-hole malleable iron for surface mounted conduits.

F. Cable Ties: High strength nylon temperature rated to 185 degrees F. Self locking.

2.2 FORMED STEEL CHANNEL

A. Manufacturers:
1. Allied Tube & Conduit Corp.
2. B-Line Systems
3. Midland Ross Corporation, Electrical Products Division.
4. Unistrut Corp.
5. Powerstrut
6. Kindorf

B. Product Description: Galvanized 12 gage thick steel. With holes 1-1/2 inches on center.

2.3 SPRING STEEL CLIPS

A. Product Description: Mounting hole and screw closure.

2.4 FIRESTOPPING

A. Manufacturers:
1. Dow Corning Corp.
2. Fire Trak Corp.
3. Hilti Corp.
4. International Protective Coating Corp.
5. 3M fire Protection Products.
6. Specified Technology, Inc.

B. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.

1. Silicone Firestopping Elastomeric Firestopping: Single component silicone elastomeric compound and compatible silicone sealant.
2. Foam Firestopping Compounds: Single component foam compound.
3. Formulated Firestopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non-asbestos fibers.
4. Fiber Stuffing and Sealant Firestopping: Composite of mineral or ceramic fiber stuffing insulation with silicone elastomer for smoke stopping.
5. Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
6. Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.
7. Firestop Pillows: Formed mineral fiber pillows.

2.5 FIRESTOPPING ACCESSORIES

A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.

B. Dam Material: Permanent:
1. Mineral fiberboard.
2. Mineral fiber matting.
3. Sheet metal.
4. Plywood or particle board.
5. Alumina silicate fire board.

C. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.

D. General:
1. Furnish UL listed products or products tested by independent testing laboratory.
2. Select products with rating not less than rating of wall or floor being penetrated.

E. Non-Rated Surfaces:
1. Stamped steel, chrome plated, hinged, split ring escutcheons or floor plates or ceiling plates for covering openings in occupied areas where piping is exposed.
2. For exterior wall openings below grade, furnish mechanical sealing device to continuously fill annular space between piping and cored opening or water-stop type wall sleeve.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify openings are ready to receive sleeves.

B. Verify openings are ready to receive firestopping.

3.2 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.

B. Remove incompatible materials affecting bond.

C. Install backing and damming materials to arrest liquid material leakage.

D. Obtain permission from Contacting Officer before using powder-actuated anchors.

E. Do not drill or cut structural members.

3.3 INSTALLATION - HANGERS AND SUPPORTS

A. Anchors and Fasteners:

1. Concrete Structural Elements: Provide precast inserts, expansion anchors and preset inserts.
2. Steel Structural Elements: Provide beam clamps and spring steel clips.
3. Concrete Surfaces: Provide expansion anchors.
4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Provide toggle bolts and hollow wall fasteners.
5. Solid Masonry Walls: Provide expansion anchors and preset inserts.
6. Sheet Metal: Provide sheet metal screws.
7. Wood Elements: Provide wood screws.

B. Install conduit and raceway support and spacing in accordance with NEC.

C. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.

D. Install multiple conduit runs on common hangers.

E. Supports:
1. Fabricate supports from structural steel or formed steel channel. Install hexagon head bolts to present neat appearance with adequate strength and rigidity. Install spring lock washers under nuts.
2. Install surface mounted cabinets and panelboards with minimum of four anchors.
3. In wet and damp locations install steel channel supports to stand cabinets and panelboards 1 inch off wall.
4. Support vertical conduit at every other floor.

END OF SECTION

SECTION 26 05 33

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes conduit and tubing, surface raceways, wireways, outlet boxes, pull and junction boxes, and handholes.

1.2 REFERENCES

A. American National Standards Institute:
1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
2. ANSI C80.3 - Specification for Electrical Metallic Tubing, Zinc Coated.
3. ANSI C80.5 - Aluminum Rigid Conduit - (ARC).

B. National Electrical Manufacturers Association:
1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
2. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
3. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
4. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.
5. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
6. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
7. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

1.3 SYSTEM DESCRIPTION

A. All wiring shall be in conduit unless specifically noted otherwise.

B. All conduit shall be concealed behind walls, below floors, below roof and above ceilings unless the space is an unfinished area or utility space such as a mechanical or electrical room or unless specifically noted otherwise.

C. All conduit shall be run above slab unless specifically shown on the drawings or described otherwise.

D. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.

1.4 DESIGN REQUIREMENTS

A. Minimum Raceway Size: ½ inch unless otherwise specified.

1.5 SUBMITTALS

A. Product Data: Submit for the following:
1. Flexible metal conduit.
2. Liquidtight flexible metal conduit.
3. Nonmetallic conduit.
4. Flexible nonmetallic conduit.
5. Nonmetallic tubing.
6. Raceway fittings.
7. Conduit bodies.
8. Surface raceway.
9. Wireway.
10. Pull and junction boxes.
11. Handholes.

B. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.6 CLOSEOUT SUBMITTALS

A. Project Record Documents:

1. Record actual routing of conduits larger than 2 inches.
2. Record actual locations and mounting heights of outlet, pull, and junction boxes.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

B. Protect PVC conduit from sunlight.

1.8 COORDINATION

A. Coordinate location of boxes and devices with architectural elevations and shop drawings of mill and case work.

B. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.

C. Coordinate switch locations with door swings.

PART 2 - PRODUCTS

2.1 METAL CONDUIT

A. Rigid Steel Conduit (RMC-S): ANSI C80.1.

B. Rigid Aluminum Conduit (RMC-A): ANSI C80.5.

C. Intermediate Metal Conduit (IMC): Rigid steel.

D. Fittings and Conduit Bodies: NEMA FB 1; material to match conduit.

2.2 PVC COATED METAL CONDUIT

A. Product Description: NEMA RN 1; rigid steel conduit (RMC-S) with external PVC coating, 20 thick.

B. Fittings and Conduit Bodies: NEMA FB 1; steel fittings with external PVC coating to match conduit.

2.3 FLEXIBLE METAL CONDUIT

A. Product Description: (FMC) Interlocked steel construction.

B. Fittings: ANSI/NEMA FB 1.

2.4 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

A. Product Description: (LFMC) Interlocked steel or aluminum construction with PVC jacket.

B. Fittings: ANSI/NEMA FB 1.

2.5 ELECTRICAL METALLIC TUBING (EMT)

A. Product Description: ANSI C80.3; galvanized tubing.

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel, compression or set screw indenter type.

C. Provide connectors with insulated throat.

2.6 NONMETALLIC CONDUIT

A. Product Description: NEMA TC 2; Schedule 40 PVC (RNC-40) and Schedule 80 PVC (RNC-80).

B. Fittings and Conduit Bodies: NEMA TC 3.

2.7 WIREWAY

A. Product Description: General purpose and Raintight type wireway.

B. Knockouts: None.

C. Size: as indicated on Drawings.

D. Cover: Screw cover.

E. Connector: Slip-in.

F. Fittings: Lay-in type with removable top, bottom, and side; captive screws and drip shield.

G. Finish: Rust inhibiting primer coating with gray enamel finish.

2.8 OUTLET BOXES

A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
1. Minimum 4”x 4”x 2-1/8” deep
2. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 1/2 inch male fixture studs where required.
3. Concrete Ceiling Boxes: Concrete type.
4. Provide boxes installed inside wall cavities with back brace to prevent deflection of box away from finished wall surface.
5. Provide plaster rings of correct depth to match wall thickness and finishes. Verify wall and finish thickness from Architectural documents prior to installation. Wiring devices shall be snuggly attached to boxes. Wiring devices supported by plaster ears of the device or field made spacers will not be acceptable. Remedy of this situation will require removal and replacement of the plaster ring with one of proper depth and repair of the wall and finishes.

B. Nonmetallic Outlet Boxes: NEMA OS 2.

C. Cast Floor Boxes: NEMA FB 1, Type FD, aluminum or cast feralloy. Furnish gasketed cover by box manufacturer.

D. Wall Plates for Finished Areas: As specified in Section 26 27 26.

E. Wall Plates for Unfinished Areas: Furnish gasketed cover.

2.9 PULL AND JUNCTION BOXES

A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

B. Hinged Enclosures: As specified in Section 26 27 16.

C. Surface Mounted Cast Metal Box: NEMA 250, Type 4; flat-flanged, surface mounted junction box:
1. Material: Galvanized cast iron or Cast aluminum.
2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

D. In-Ground Cast Metal Box: NEMA 250, Type 6, flanged, recessed cover box for flush mounting:
1. Material: Galvanized cast iron or Cast aluminum.
2. Cover: Nonskid cover with neoprene gasket and stainless steel cover screws.
3. Cover Legend: "ELECTRIC".

E. Fiberglass Handholes: Die-molded, glass-fiber [concrete composite] hand holes:
1. Cable Entrance: Pre-cut 6 inch x 6 inch cable entrance at center bottom of each side.
2. Cover: Glass-fiber, weatherproof cover with nonskid finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify outlet locations and routing and termination locations of raceway prior to rough-in.

3.2 APPLICATION - RACEWAY

A. Underground and buried under-slab:
1. Greater than 2'-0" bury depth: RNC-40
2. 2'-0" bury depth or less: RNC-80
3. Sweep and riser to above grade or slab PVC coated rigid metallic (RMC-S). Rise to first connector with PVC coated rigid metallic.
4. There shall be no exposed rigid nonmetallic conduit (RNC).
5. Provide cast metal boxes or nonmetallic handhole.

B. Dry Locations, Concealed within or suspended under building:
1. EMT.
2. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas.
3. Provide hinged enclosure for large pull boxes.

C. Wet and Damp Locations, Concealed within or suspended under building:
1. RMC-S, RMC-A or IMC.
2. Provide cast metal or nonmetallic outlet, pull, and junction boxes.

D. Exposed within building
1. Below 8'-0" above finished floor: RMC-S, RMC-A or IMC.
2. Above 8'-0": EMT
3. Provide sheet-metal boxes.
4. Provide flush mounting outlet box in finished areas.
5. Provide hinged enclosure for large pull boxes.

E. Exposed exterior to building:
1. Exposed areas:
a. RMC-S, RMC-A, or IMC.
b. Provide cast metal or nonmetallic outlet, pull, and junction boxes.

F. Connections to equipment:
1. Within building or suspended under building: FMC
2. Exterior to building: LFMC
3. Length of connector: 3'-0" maximum unless noted otherwise.

3.3 INSTALLATION

A. Ground and bond raceway and boxes in accordance with Section 26 05 26.

B. Fasten raceway and box supports to structure and finishes in accordance with Section 26 05 29.

C. Identify raceway and boxes in accordance with Section 26 05 53.

D. Arrange raceway and boxes to maintain headroom and present neat appearance.

3.4 INSTALLATION - RACEWAY

A. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.

B. Do not install raceway underground or under-slab unless specifically noted otherwise.

C. Arrange raceway supports to prevent misalignment during wiring installation.

D. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

E. Group related raceway; support using conduit rack. Construct rack using steel channel specified in Section 26 05 29.

F. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports

G. Do not attach raceway to ceiling support wires or other piping systems.

H. Construct wireway supports from steel channel specified in Section 26 05 29.

I. Route exposed raceway parallel and perpendicular to walls.

J. Route raceway installed above accessible ceilings parallel and perpendicular to walls.

K. Route conduit in and under slab from point-to-point.

L. Maintain clearance between raceway and piping for maintenance purposes.

M. Maintain 12 inch clearance between raceway and surfaces with temperatures exceeding 104 degrees F.

N. Cut conduit square using saw or pipe cutter; de-burr cut ends.

O. Bring conduit to shoulder of fittings; fasten securely.

P. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for minimum 20 minutes.

Q. Install conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.

R. Install no more than equivalent of three 90 degree bends between boxes. Install conduit bodies to make sharp changes in direction, as around beams. Install hydraulic one-shot bender to fabricate bends in metal conduit larger than 2 inch size.

S. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.

T. Install fittings to accommodate expansion and deflection where raceway crosses control and expansion joints.

U. Install insulated bushings or insulated throat bushings at all connections to boxes, fixtures, equipment or other devices and terminations.

V. Install suitable pull string or cord in each empty raceway except sleeves and nipples.

W. Install suitable caps to protect installed conduit against entrance of dirt and moisture.

X. Surface Raceway: Install flat-head screws, clips, and straps to fasten raceway channel to surfaces; mount plumb and level. Install insulating bushings and inserts at connections to outlets and corner fittings.

Y. Close ends and unused openings in wireway.

3.5 INSTALLATION - BOXES

A. Install wall mounted boxes at elevations to accommodate mounting heights as indicated on Drawings or as indicated in architectural elevations. Receptacles shall be mounted at 18” and switches at 48” to center AFF if not otherwise noted.

B. Adjust box location up to 10 feet prior to rough-in to accommodate intended purpose.

C. Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26 or as indicated in Architectural elevations.

D. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

E. In Accessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.

F. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

G. Do not install flush mounting box back-to-back in walls; install with minimum 6 inches of separation. Install with minimum 24 inches of separation in acoustic rated walls.

H. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

I. Install stamped steel bridges to fasten flush mounting outlet box between studs.

J. Provide proper bridging or back-of-box support so that there is no deflection in the box when operating a switch or plugging in a cord cap. Inadequately supported boxes and devices shall be removed, repaired and refinished.

K. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

L. Install adjustable steel channel fasteners for hung ceiling outlet box.

M. Do not fasten boxes to ceiling support wires or other piping systems.

N. Support boxes independently of conduit.

O. Install gang box where more than one device is mounted together. Do not use sectional box.

P. Install gang box with plaster ring for single device outlets.

Q. All boxes shall be mounted so that the devices and cover plates are flush to the walls, plumb and level with adjacent devices. If devices are not plumb, the box shall be removed and straightened. Any finishes damaged shall be repaired to the satisfaction of the Contacting Officer.

3.6 INTERFACE WITH OTHER PRODUCTS

A. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation.

B. Locate outlet boxes to allow luminaires positioned as indicated on Drawings.

C. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

3.7 ADJUSTING

A. Adjust flush-mounting outlets to make front flush with finished wall material.

B. Install knockout closures in unused openings in boxes.

3.8 CLEANING

A. Clean interior of boxes to remove dust, debris, and other material.

B. Clean exposed surfaces and restore finish.

END OF SECTION

SECTION 26 05 53

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes field applied:
1. Nameplates.
2. Labels.
3. Wire markers.
4. Conduit markers.
5. Stencils.
6. Underground Warning Tape.
7. Lockout Devices.

1.2 REFERENCES

A. NFPA 70 – National Electrical Code

1.3 SUBMITTALS

A. Product Data:
1. Submit manufacturer’s catalog literature for each product required.
2. Submit electrical identification schedule including list of wording, symbols, letter size, color coding, tag number, location, and function.

B. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of tagged devices; include tag numbers.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Accept identification products on site in original containers. Inspect for damage.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

C. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Install labels and nameplates only when ambient temperature and humidity conditions for adhesive are within range recommended by manufacturer.

PART 2 - PRODUCTS

2.1 NAMEPLATES AND LABELS

A. Product Description:
1. Laminated three-layer plastic with engraved black letters on white contrasting background color.

B. Letter Size:
1. 1/8 inch high letters for identifying individual equipment and loads.
2. 1/4 inch high letters for identifying grouped equipment and loads.

C. Minimum nameplate thickness: 1/8 inch.

2.2 WALL PLATE IDENTIFICATION

A. Section 26 27 26 – Wire Devices: Cover plate identification.

2.3 WIRE MARKERS

A. Description: Cloth tape, split sleeve, or tubing type wire markers.

B. Legend:
1. Power and Lighting Circuits: Branch circuit or feeder number as indicated on Drawings.
2. Control Circuits: Control wire number as indicated on Drawings.

2.4 CONDUIT AND RACEWAY MARKERS

A. Description: Labels fastened with adhesive or Stencils.

B. Color:
1. 480 Volt System: Red lettering on white background.
2. 208 Volt System: Black lettering on white background.

C. Legend:
1. 277/480 Volt System: HIGH VOLTAGE.
2. 208 Volt System: 208 VOLTS.

2.5 STENCILS

A. Stencils: With clean cut symbols and letters of following size:
1. Up to 2 inches Outside Diameter of Raceway: 1/2 inch high letters.
2. 2-1/2 to 6 inches Outside Diameter of Raceway: 1 inch high letters.

B. Stencil Paint: As specified in Section 09 90 00, semi-gloss enamel, colors conforming to the following:
   1. Black lettering on white background.
   2. White lettering on gray background.
   3. Red lettering on white background for emergency circuits.

2.6 UNDERGROUND WARNING TAPE

A. Manufacturers:
   1. Terra Tape

B. Description: 4 inch wide plastic tape, detectable type, colored red with suitable warning legend describing buried electrical lines.

PART 3 - EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

B. Prepare surfaces in accordance with Section 09 90 00 for stencil painting.

3.2 INSTALLATION

A. Install identifying devices after completion of painting.

B. Nameplate Installation:
   1. Install nameplate parallel to equipment lines.
   2. Install nameplate for each electrical distribution and control equipment enclosure with corrosive-resistant mechanical fasteners, or adhesive.
   3. Install nameplates for each control panel and major control components located outside panel with corrosive-resistant mechanical fasteners, or adhesive.
   4. Secure nameplate to equipment front using screws or rivets.
   5. Secure nameplate to inside surface of door on recessed panelboard in finished locations.
   6. Install nameplates for the following:
      a. Switchboards.
      b. Panelboards.
      c. Transformers.
      d. Service Disconnects.
      e. Equipment Disconnects.
      f. Starters.
      g. Equipment Controllers (VFD, Contactors, etc.)

C. Label Installation:
   1. Install label parallel to equipment lines.
   2. Install labels for permanent adhesion and seal with clear lacquer.

D. Wire Marker Installation:

1. Install wire marker for each conductor at panelboard gutters, pull boxes, and each load connection.
2. Mark data cabling at each end. Install additional marking at accessible locations along the cable run.

E. Raceway Marker Installation:
1. Install raceway marker for each conduit or raceway longer than 20 feet.
2. Raceway Marker Spacing: 20 feet on center.
3. Raceway Painting: Identify conduit using field painting in accordance with Section 09 90 00
   a. Paint colored band on each conduit longer than 20 feet.
   b. Paint bands 20 feet on center.
   c. Color:
      1) 480 Volt System: Blue.
      2) 208 Volt System: Yellow.

F. Stencil Installation:
1. Apply stencil painting in accordance with architectural painting Section.

G. Underground Warning Tape Installation:

H. Install underground warning tape along length of each underground conduit, raceway, or cable 12 inches directly above buried conduit, raceway, or cable.

END OF SECTION

SECTION 26 28 20

ELECTRICAL EQUIPMENT

PART 1 - GENERAL

1.1 SCOPE

A. Furnish and install all labor and material necessary for complete and working systems, including:
   1. Safety and Disconnect Switches
   2. Fuses
   3. Contactors
   4. Motor Starters

1.2 SUBMITTAL

A. Provide submittal in accordance with Section 26 01 00.

B. Provide submittal for all material described herein.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Square D

B. GE

C. ITE

D. Siemens

E. Eaton

2.2 SAFETY AND DISCONNECT SWITCHES

A. Provide UL listed safety switches which meet NEMA-KSI-1975 for heavy-duty type with single interlock, quick-make, quick-break, and high pressure fuse holders where required.

B. Switches exposed to weather shall be in NEMA 3R rain-tight enclosures with raintight hubs. In interior locations, they shall be in NEMA 1 general purpose enclosures, unless indicated otherwise.

C. Provide switches in types, sizes, features, ratings, and enclosures as indicated on drawings for equipment disconnects. Provide units with ratings suitable to loads, per N.E.C.

D. Switches in kitchen area shall be stainless steel type 3R.

2.3 FUSES

A. Provide U.L. listed and labeled fuses for overcurrent protection and to leave system in complete working order. Feeder circuit fuses shall correspond with ampacity of the protected feeder. Size motor circuit fuses from standard fuse tables. Determine exact motor size and rating of motor from motor nameplate and furnish properly sized fuses.

B. Fuses shall have ampere ratings as indicated on drawings, and voltage rating equal to, or greater than, voltage at their point of application. All fuse contact surfaces shall be plated.

C. Fuses to 600 amperes shall be Bussman Low Peak Dual Element type LPN-RK (250 volts) or Gould Shawmut A2D and Bussman LSP-RK (600 volts) or Gould Shawmut A6D, unless

otherwise noted. Fuses above 600 amperes shall be Bussman KRP-C or Gould Shawmut A4BT time delay fuses unless otherwise noted.

D. Provide spare fuses in quantities of 10% of each size and type installed, but in no case less than three spares of each size. Deliver spare fuses to Owner, neatly enclosed in suitable cabinet.

2.4 CONTACTORS

A. Multi-pole, as indicated on drawings. Provide each contactor with 2 additional spare poles above those indicated.

B. Magnetically held with 120 volt coil.

C. Contacts rated at 30 amps ballasted, 20 amps tungsten.

D. Total enclosed contacts with status indicators.

E. NEMA Type 1 enclosure.

F. Hand-Off-Auto switch with red indication light.

2.5 MOTOR STARTERS

A. Magnetic motor starters shall be U.L. listed and labeled, full voltage, non-reversing type. Each starter shall be furnished, completely wired, with accessories as follows:
   1. HAND-OFF-AUTOMATIC switch,
   2. Red "ON" pilot light,
   3. 120 volt control transformer.
   4. Overload relay, resettable thermal type, with ambient compensated heater elements to match motor load.
   5. NEMA 1 enclosure, unless noted otherwise or as otherwise required by equipment location.
   6. 2 auxiliary switches with NO & NC contacts.

B. Provide combination starter and disconnect switch where indicated on drawings.

C. Verify motor size and requirements from supplier prior to ordering starters.

D. Motor starters for fans in kitchen area shall be combination type with stainless steel NEMA 3R enclosure.

PART 3 - EXECUTION

3.1 TESTING

A. Take amperage and voltage readings at each switchboard and panelboard with circuits in operation and submit typewritten tabulation of readings to Engineer to demonstrate that load is balanced at each board.

B. Do not test disconnect switches by operating them under load. However, demonstrate switch operation through six opening/closings. Remove and replace defective units with new units and retest to demonstrate compliance.

3.2 INSTALLATION

A. Coordinate electrical equipment installation with other building components.

B. Sequence, coordinate, and integrate installation of electrical equipment for efficient flow of work. Give particular attention to large equipment requiring installation prior to closing-in rooms.

C. Install electrical equipment to facilitate maintenance and repair or replacement of

equipment components.

D. Before energizing the system and again prior to substantial completion of the project, completely clean the inside and outside of each panel of all debris, dust and other such foreign material.

END OF SECTION

SECTION 26 51 01

LIGHTING

PART 1 - GENERAL

1.1 SCOPE

A. Furnish and install all labor and materials as required for complete and working lighting system including:
   1. Light Fixtures
   2. Ballasts
   3. Lamps

1.2 GENERAL

A. Provide interior lighting fixtures and emergency lighting units which have been UL listed and labeled.

1.3 SUBMITTALS

A. Submit manufacturer's data on lighting fixtures, lamps and ballasts.
   1. Include electrical ratings and photometric data with certified results of independent laboratory tests.
   2. Include data on batteries of emergency lighting units.

B. Submit dimensioned drawings of lighting fixtures. Submit fixture shop drawings in booklet form with separate sheet for each fixture, assembled in order of luminaire "Type" designation with proposed fixture and accessories clearly indicated on each sheet.

PART 2 - PRODUCTS

2.1 LIGHTING FIXTURES

A. Provide lighting fixtures and components of sizes, types, and ratings as indicated on drawings and listed in fixture schedule, complete with ballasts, lamps, starters, suspension accessories, canopies, hickey, casings, sockets, lamp holders, frames, housings, and wiring. Verify type and fire-rating of actual ceiling suspension system to be installed by Ceiling Contractor prior to ordering fixtures. If fixture type designation is omitted, fixture shall be same type as scheduled for rooms of similar usage.

2.2 BALLASTS

A. Provide fluorescent lamp ballasts of type indicated in lighting fixture schedule. Design and construction shall conform to CBM and UL standards. Ballasts shall be UL Class P and sound rated A.

B. Where scheduled, provide electronic integrated fluorescent ballasts conforming to Federal Communications Commission (FCC) Rules and Regulations, Part 18, Class A, with following characteristics:
   1. Sound operating level of 2dB above 16dB ambient.
   2. CBM certified full light output type, compatible for use with lamps specified.

3. Average lamp current crest factor below 1.4.
4. Input current Total Harmonic Distortion content below 20 percent of full light output current level for lamps specified.
5. Sequenced start progression which first heats cathode filaments and then ignites lamp.
6. Able to withstand line transients as defined in ANSI/IEEE C62.41, Category A.
7. Frequency of operation of 20 kHz or greater, and operation without visible flicker.
8. Power factor of 90% or higher.
9. No polychlorinated biphenyl's (PCB's).
10. Compliance with FCC rules and regulations concerning generation of EMI (electromagnetic interference) and RFI (radio frequency interference).

C. Provide HID lamp ballasts capable of operating lamp types of ratings indicated. Ballasts shall be high power factor type with capacitor installed outside ballast enclosure for easy field replacement.

D. Acceptable manufacturers: ADVANCE, VALMONT, MOTOROLA, UNIVERSAL.

2.3 LAMPS

A. Lamps shall be as indicated in fixture schedule, of size, beam, and wattage as indicated.

B. Acceptable Manufacturers: GENERAL ELECTRIC, OSRAM-SYLVANIA, PHILLIPS.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Lighting fixtures shall be installed in symmetrical patterns with ceiling grids, partitions, air devices, speakers, etc. Locations shown on electrical drawings are of a general nature and shall not be scaled for location. Contractor shall refer to Architectural reflected ceiling plans for specific locations of light fixture locations.

B. Fixtures shall be installed in neat, workmanlike appearance. Recessed fixtures shall have trims or frames installed "snug" to ceilings; surface mounted fixtures shall have housings installed "snug" to ceilings and plumb; stem mounted fixtures shall have stems installed plumb.

C. Clean fixtures of dirt and debris upon completion of installation. Protect fixtures already installed, from damage during remainder of construction.

D. Recessed fluorescent lighting fixtures shall have four (4) tie wires on each fixture (one at each corner) connected to structure. Connection to other systems is not acceptable. Tie wires shall be galvanized steel, as used for suspending ceiling tiles, not aluminum.

E. Fluorescent and HID lamps may be used in finishing out of project. Lamps that have been used for more than 1/3 of their rated life (as determined by the Owner's construction inspector records) or that have blackened ends, shall be replaced by new lamps just before final inspection. Incandescent lamps shall be new at time of final inspection.

F. Upon completion of installation of lighting fixtures, and after building circuitry is energized, apply energy to demonstrate compliance with requirements. Correct malfunctioning units and replace defective lamps, then retest.

END OF SECTION

Bid 17105-186
Williamson County, Texas

WILLIAMSON COUNTY
JAIL RENOVATION

306 W. 4TH ST.
GEORGETOWN, TX 78626

COVER SHEET

C100 - LOCATION MAP AND DRAWING LIST

ARCHITECTURAL PLANS

A000 - VICINITY MAP & SYMBOLS
A101 - OVERALL FIRST FLOOR PLAN
A201 - KITCHEN DEMO PLAN
A301 - KITCHEN / REFLECTED CEILING PLAN

STRUCTURAL PLANS

S100 - FOUNDATION PLAN

FIRE STOPPING PLANS AND DETAILS

FS101 - FIRE STOPPING ASSEMBLIES DETAILS
FS102 - FIRE STOPPING PLAN - SECOND FLOOR
FS103 - FIRE STOPPING PLAN - THIRD FLOOR
FS104 - FIRE STOPPING PLAN - FOURTH FLOOR

PLUMBING PLANS

P101 - PLUMBING WATER PLAN - FIRST FLOOR
P102 - PLUMBING WATER PLAN - SECOND FLOOR
P103 - PLUMBING WATER PLAN - THIRD FLOOR
P200 - PLUMBING WASTE PIPING PLAN - BASEMENT
P201 - PLUMBING WASTE PIPING PLAN KITCHEN
P301 - PLUMBING GAS PIPING PLAN - FIRST FLOOR
P401 - ENLARGED BOILER ROOM PLAN
P402 - PLUMBING RISERS

MECHANICAL PLANS

MD001 - MECHANICAL DEMO PLAN - FIRST FLOOR
ME101 - MECHANICAL / ELECTRICAL - ROOF PLAN
M100 - MECHANICAL HVAC PLAN - BASEMENT
M101 - MECHANICAL HVAC PLAN - FIRST FLOOR
M102 - MECHANICAL HVAC PLAN - FIRST FLOOR
M201 - MECHANICAL KITCHEN EQUIPMENT PLAN
M301 - MECHANICAL KITCHEN HOOD DETAILS
M302 - MECHANICAL KITCHEN HOOD DETAILS
M401 - MECHANICAL CONTROLS
M402 - MECHANICAL SEQUENCE & I/O SCHEDULE
M501 - MECHANICAL DETAILS
M601 - MECHANICAL SCHEDULES
M602 - MECHANICAL SCHEDULES

ELECTRICAL PLANS

E000 - SYMBOLS LEGEND
ED001 - ELECTRICAL DEMO PLAN - FIRST FLOOR
E101 - ELECTRICAL LIGHTING PLAN - FIRST FLOOR
E200 - ELECTRICAL POWER PLAN - BASEMENT
E201 - ELECTRICAL POWER PLAN - FIRST FLOOR
E202 - ELECTRICAL POWER PLAN

FOOD SERVICE PLANS

K100 - KITCHEN EQUIPMENT LAYOUT
K101 - KITCHEN EQUIPMENT ELECTRICAL ROUGH-INS
K102 - FOOD SERVICE EQUIPMENT DETAILS
K103 - FOOD SERVICE EQUIPMENT DETAILS
K104 - FOOD SERVICE EQUIPMENT DETAILS
K105 - KITCHEN EQUIPMENT - REFRIGERATION SYSTEM

LOCAL MAP



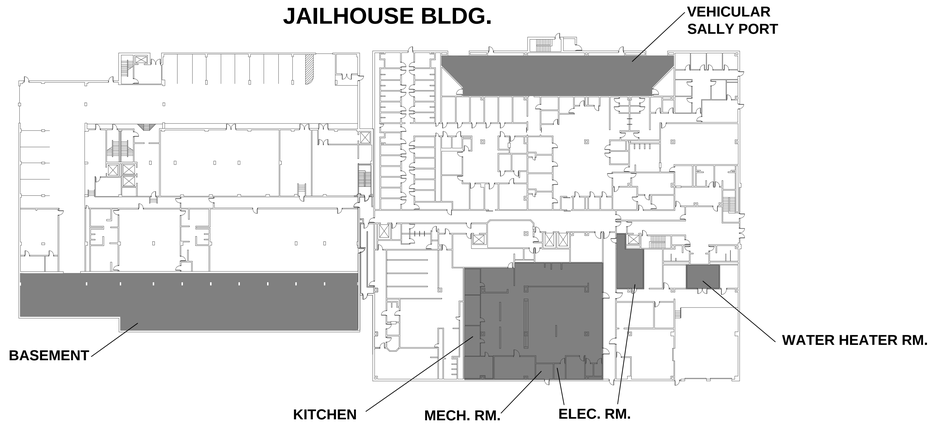
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GEORGETOWN, TX 78626

MARK	DATE	DESCRIPTION
	5.22.17	CONSTRUCTION DOCS

PROJECT NO:
DRAWN BY: SR
DESIGNED BY: OV
CHECKED BY: TA

SHEET TITLE
COVER SHEET

C100
SHEET

6/1/2017 8:38 AM
p. 304

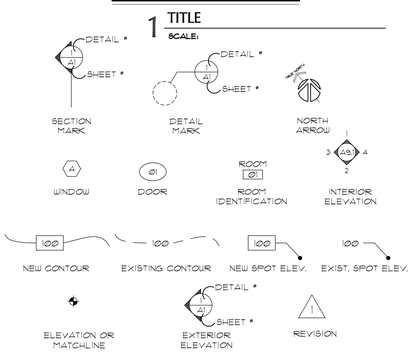
Bid 17105-186

Williamson County, Texas

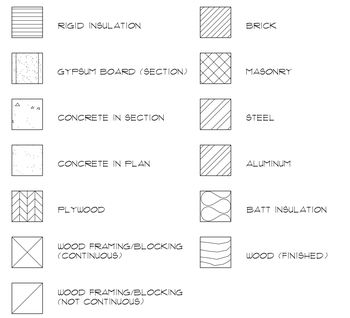
ABBREVIATIONS

ABV.	ABOVE
ADJ.	ADJUSTABLE
A.F.F.	ABOVE FINISH FLOOR
ALUM.	ALUMINUM
ALUMN.	ALUMINUM
ANOD.	ANODIZED
ARCH.	ARCHITECT(URAL)
BLDG.	BUILDING
B.U.R.	BUILT UP ROOF
C.J.	CONTROL JOINT
CLG.	CEILING
CONC.	CONCRETE
CONST.	CONSTRUCT(EDXION)
CONV.	CONVENTIONAL
CONT.	CONTINUOUS
C.T.	CERAMIC TILE
DK.	DARK
DIA.	DIAMETER
DN	DOWN
D.S.	DOUN SPOUT
DWG.	DRAWING
(E)	EXISTING
EA.	EACH
E.J.	EXPANSION JOINT
ELEC.	ELECTRICAL
EL.	ELEVATION
EQUIP.	EQUIPMENT
E.W.C.	ELECTRIC WATER COOLER
F.D.	FINISH(ED&XED)
F.E.	FIRE EXTINGUISHER
F.E.C.	FIRE EXTINGUISHER CABINET
FIN.	FLOOR DRAIN
FL.	FLOW
F.O.C.	FACE OF CONCRETE
F.O.F.	FACE OF FINISH
F.O.S.	FACE OF STUD
F.R.	FIRE-RETARDANT
FURN.	FURNISHED
GALV.	GALVANIZED
GA.	GAUGE or GAGE
G.C.	GENERAL CONTRACTOR
GYP. BD.	GYPSUM BOARD
H.C.	HOLLOW CORE
H.M.	HOLLOW METAL
HORIZ.	HORIZONTAL
HT.	HEIGHT
I.D.	INSIDE DIAMETER
JT.	JOINT
K.S.	KNEE SPACE
LAV.	LAVATORY
MAX.	MAXIMUM
MBM	METAL BUILDING MANUFACTURER
MECH.	MECHANICAL
MET.	METAL
MFR.	MANUFACTURER
M.R.	MOISTURE RESISTANT
MTL.	MATERIAL
(N)	NEW
NAT.	NATURAL
N.I.C.	NOT IN CONTRACT
NOM.	NOMINAL
N.T.S.	NOT TO SCALE
O.C.	ON CENTER
O.D.	OUTSIDE DIAMETER
O.F.C.I.	OUNER FURNISHED CONTRACTOR INSTALLED
OPG.	OPENING
OPP.	OPPOSITE
PR.	PAIR
PRKG.	PARKING
PLAS. LAM.	PLASTIC LAMINATE
P.W.	PLYWOOD
R.	RISER
R.A.	RETURN AIR
REF.	REFER (TO)
REF.	REFRIGERATOR
REINF.	REINFORCE(D)
REQD.	REQUIRED
R.D.	ROOF DRAIN
RND.	ROUND
R.O.	ROUGH OPENING
S.C.	SOLID CORE
S.F.	SQUARE FEET
SIM.	SIMILAR
SPEC.	SPECIFICATIONS
S.S.	STAINLESS STEEL
STD.	STANDARD
STL.	STEEL
STRUCT.	STRUCTURAL
T.	TREAD
T.O.S.	TOP OF STEEL
T.O.C.	TOP OF CONCRETE/CURB
T.O.M.	TOP OF MASONRY
T.O.R.	TOP OF ROOF
T.O.W.	TOP OF WALL
TYP.	TYPICAL
U.N.O.	UNLESS NOTED OTHERWISE
V.C.T.	VINYL COMPOSITION TILE
V.W.C.	VINYL WALL COVERING
W/	WITH
W.C.	WATER CLOSET
W.R.	WATER RESISTANT
W.W.F.	WELDED WIRE FABRIC

SYMBOLS LEGEND



MATERIAL LEGEND



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REGISTERED ARCHITECT JAMES W. WALLACE 6025 STATE OF TEXAS

5-22-17

THE WALLACE GROUP
ENGINEERS
ARCHITECTS
PLANNERS
SURVEYORS
WACO, TEXAS

WILLIAMSON COUNTY JAIL RENOVATION

MARK	DATE	DESCRIPTION
	5.22.17	CONSTRUCTION DOCS

PROJECT NO:	22891
DRAWN BY:	CC
DESIGNED BY:	DV
CHECKED BY:	GJ

SHEET TITLE

SYMBOLS & ABBREVIATIONS

A000

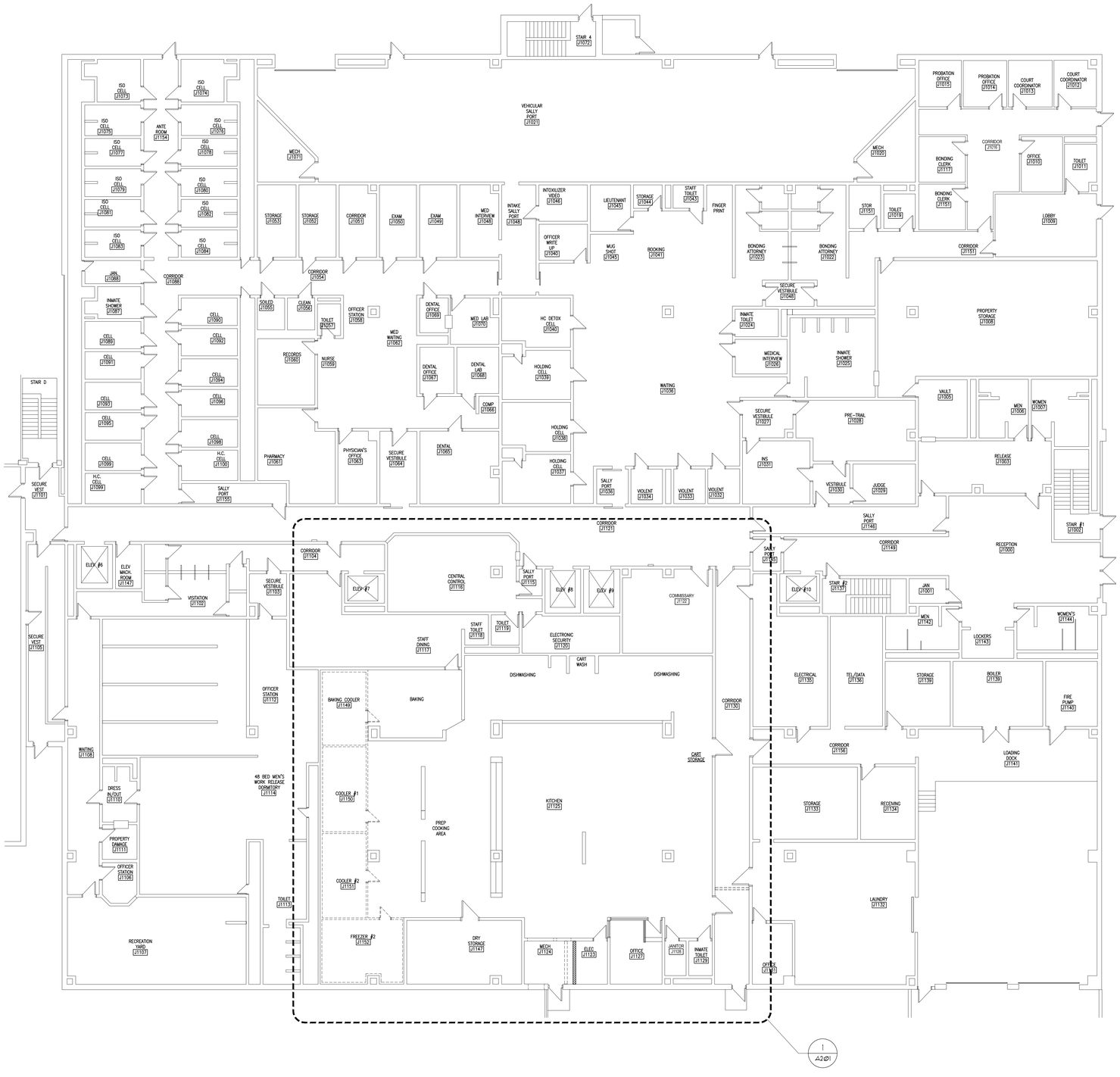
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6/1/2017 8:38 AM

Bid 17105-166

Williamson County, Texas



1 OVERALL 1ST FLOOR PLAN

3/32" = 1'-0"

GENERAL NOTES

1. THESE DRAWINGS SHOW THE GENERAL INTENT TO RECEIVE A QUALITY FINISHED PRODUCT. A JOB SITE VISIT TO VERIFY EXIST. CONDITIONS MUST BE MADE BY ALL TRADES. FAILURE TO DO SO WILL NOT CONSTITUTE AN EXTRA. THE CONTRACTOR IS RESPONSIBLE FOR INCLUDING ALL ITEMS REQUIRED WHETHER OR NOT ALL CONDITIONS ARE SHOWN.

2. ALL DIMENSIONS ARE TO FACE OF STUD, FACE OF MASONRY, EXT. BLDG. LINE, OR (E) FINISH UNLESS NOTED OTHERWISE.

3. ALL CONSTRUCTION TO BE IN COMPLIANCE WITH THE LATEST EDITION OF THE TEXAS DEPARTMENT OF LICENSING AND REGULATION - ARCHITECTURAL BARRIERS. ANY CONDITION CONTRARY TO THESE STANDARDS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT IMMEDIATELY.

4. THE CONTRACT DOCUMENT CONSIST OF THE DRAWINGS AND SPECIFICATIONS. ALL COMPONENTS OF THE CONTRACT DOCUMENTS ARE INTENDED TO BE USED IN CONJUNCTION WITH EACH OTHER. EACH CONTRACTOR SHALL BE RESPONSIBLE FOR KNOWLEDGE OF AND COORDINATION OF SUBJECT WORK WITH RELATED COMPONENTS IN ADDITION TO THOSE HE/SHE IS DIRECTLY BIDDING.

5. SLOPE FLOOR TO DRAIN WHERE INDICATED.

6. PENETRATIONS THROUGH SMOKE OR FIRE RATED PARTITIONS SHALL BE INSTALLED IN COMPLIANCE W/ U.L. (UNDERWRITERS LABORATORIES) "FIRE RESISTANCE RECOVERY".

7. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE PLAN AND SPECIFICATIONS AND APPLICABLE CITY OF GEORGETOWN STANDARDS.

8. ALL REMAINING ITEMS/AREAS REMOVED OR DAMAGED BY CONSTRUCTION OPERATIONS SHALL BE REPLACED OR RESTORED TO A CONDITION EQUAL TO OR BETTER THAN THAT WHICH EXISTED PRIOR TO BEGINNING CONSTRUCTION.

9. REMOVE ALL (E) FINISHES WHERE (N) FINISHES ARE INDICATED.

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REGISTERED ARCHITECT
GREGORY JOHN
STATE OF TEXAS
5-22-17

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WACO, TEXAS

WILLIAMSON COUNTY JAIL RENOVATION

MARK	DATE	DESCRIPTION
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PROJECT NO:	22891
DRAWN BY:	CC
DESIGNED BY:	DV
CHECKED BY:	GJ

SHEET TITLE
OVERALL 1ST FLOOR PLAN

A101
SHEET

G:\Projects\2289 Jail\dwg\2289 Jail - Copy A101 - 2nd.dwg, A101 1st Level, 6/1/2017 8:38 AM, AlanV, 1st Level, 1:1, 1:96.01, 44.00, 0.00, 0.00, 0

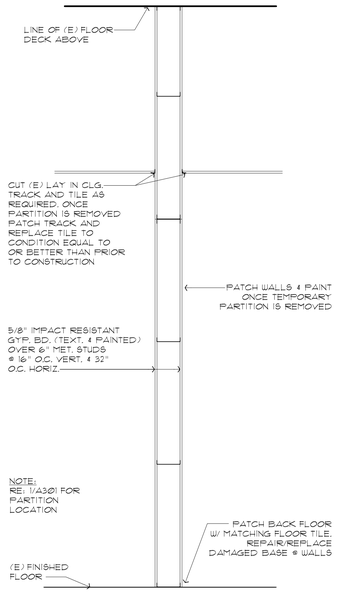
Bid 17105-166

Williamson County, Texas



1 KITCHEN PLAN – DEMO

1/8" = 1' -0"

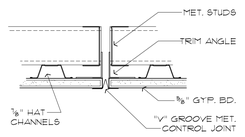


2 TEMPORARY INTERIOR PARTITION

3/4" = 1' -0"

◇ DEMOLITION NOTES

1. SAW CUT (E) CONCRETE FLOOR FOR INSTALLATION OF NEW TRENCH DRAINS, RE: PLUMBING.
2. REMOVE (E) FLOOR DRAIN, RE: PLUMB.
3. REMOVE (E) PARTITION
4. REMOVE (E) COOLER/FREEZER
5. REMOVE (E) FLOOR, RE: STRUCT.

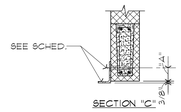


3 CONTROL JOINT

3" = 1'-0"

MASONRY LOOSE LINTEL SCHEDULE	
OPENING	LINTEL SIZE
UP TO 5'-0"	L4x4x1/4
5'-0" TO 7'-0"	L6x4x5/16 LLV
7'-0" TO 8'-0"	L7x3x3/8
8'-0" TO 10'-0"	L7x7x1/2

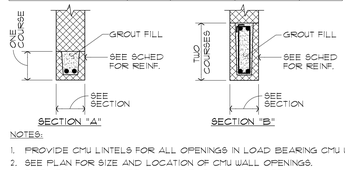
NOTE:
1. LINTEL ANGLES SHALL BE HOT DIP GALVANIZED.
2. PROVIDE 3/8" GAP IN MORTAR AT ENDS OF ANGLE. FORM GAP WITH BACKER ROD.
3. PROVIDE 4" BEARING AT EACH END OF LINTEL ANGLE.



4 TYP. LOOSE LINTEL SCHEDULE/DETAIL

N.T.S.

LOAD BEARING LINTEL SCHEDULE				
MASONRY OPENING	NOMINAL DEPTH	REINFORCING		SECTION
		LONGITUDINAL	STIRRUPS	
LESS THAN 4'-0"	8"	2 #4	#3	'A'
4'-0" BUT LESS THAN 5'-0"	16"	2 #4	#3	'B'
5'-0" BUT LESS THAN 6'-0"	16"	2 #4	#3	'B'
6'-0" BUT LESS THAN 7'-0"	16"	2 #4	#3	'B'
7'-0" BUT LESS THAN 8'-0"	16"	2 #4	#3	'B'
8'-0" BUT LESS THAN 9'-0"	16"	2 #4	#3	'B'
10'-0" BUT LESS THAN 11'-0"	16"	3 #4	#3	'B'



NOTES:
1. PROVIDE CMU LINTELS FOR ALL OPENINGS IN LOAD BEARING CMU WALLS.
2. SEE PLAN FOR SIZE AND LOCATION OF CMU WALL OPENINGS.
3. PROVIDE 8" MINIMUM BEARING AT EACH END OF LINTEL.
4. LINTELS SHALL REMAIN SHORED UNTIL MASONRY CONSTRUCTION ABOVE HAS CURED A MINIMUM OF 14 DAYS.
5. OPENINGS SHALL HAVE THE FIRST VERTICAL CELL ON EACH SIDE REINFORCED WITH 1-#5 AND GROUTED UP TO THE LINTEL BEARING ELEVATION.

NOTE:
1. REINF. BOND BEAMS W/ 2 #5 @ CONTINUOUS. TYP.

5 TYP. CMU LINTEL SCHEDULE/DETAILS

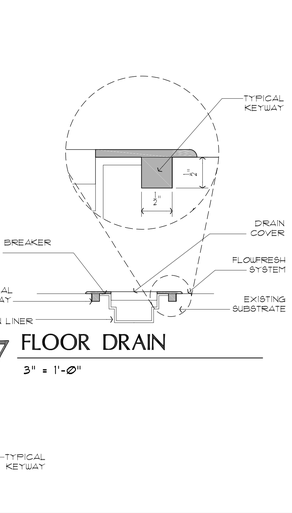
N.T.S.

GENERAL NOTES

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3. ALL REMAINING ITEMS/AREAS REMOVED OR DAMAGED BY CONSTRUCTION OPERATIONS SHALL BE REPLACED OR RESTORED TO A CONDITION EQUAL TO OR BETTER THAN THAT WHICH EXISTED PRIOR TO BEGINNING CONSTRUCTION.
4. REMOVE ALL (E) FINISHES WHERE (N) FINISHES ARE INDICATED.
5. REMOVE (E) EQUIPMENT, RETAIN FOR REINSTALLATION, TYPICAL.
6. REMOVE (E) FLOOR COATING, THROUGHOUT KITCHEN AREA.
7. REMOVE (E) LAY-IN CEILING & LIGHT FIXTURES, DIFFUSERS (RE: MEP DRAWINGS)
8. REMOVE (E) SEALS FROM FREEZERS AND COOLERS.

ASBESTOS NOTE:

SHOULD THE CONTRACTOR, SUB CONTRACTOR, OR ANY WORKMEN, UNCOVER ANY MATERIAL SUSPECTED OF CONTAINING ASBESTOS, HE SHALL IMMEDIATELY STOP WORK AND NOTIFY THE ARCHITECT. THE OWNER WILL PROVIDE THE SERVICES IF THEY ARE NEEDED FOR ANY ASBESTOS ABATEMENT. THE COST OF ABATEMENT SHALL NOT BE INCLUDED IN THIS PROJECT PRICE. IF THE CONTRACTOR, SUBCONTRACTOR, SUPPLIER, OR ANY WORKMEN DISTURB ANY ASBESTOS CONTAINING MATERIAL THE COST OF CLEANUP WILL BE THE RESPONSIBILITY OF THE CONTRACTOR.

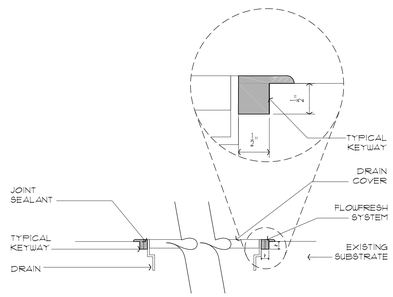


6 COVE

3" = 1'-0"

7 FLOOR DRAIN

3" = 1'-0"



8 TRENCH DRAIN

3" = 1'-0"

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REGISTERED ARCHITECT JAMES VANN 16013 STATE OF TEXAS
5-22-17

THE WALLACE GROUP
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ARCHITECTS
PLANNERS
SURVEYORS
WACO, TEXAS

WILLIAMSON COUNTY JAIL RENOVATION

MARK	DESCRIPTION	DATE
	CONSTRUCTION DOCS	5.22.17

PROJECT NO:	22891
DRAWN BY:	CC
DESIGNED BY:	DV
CHECKED BY:	GJ

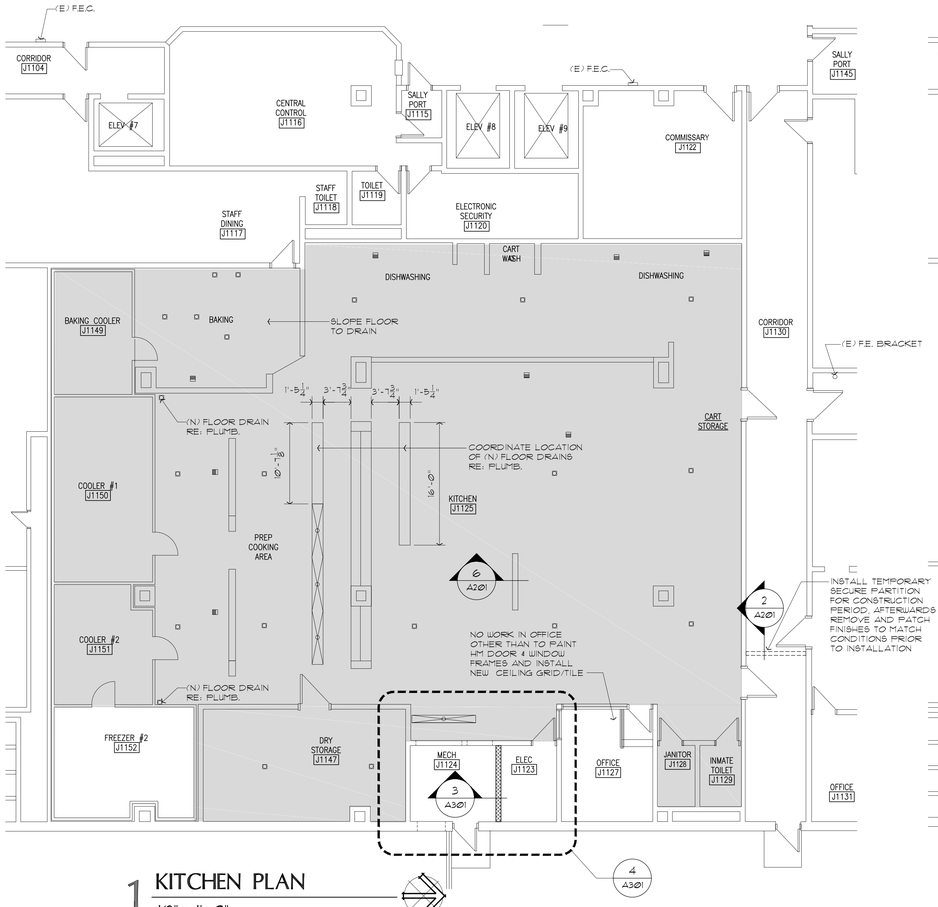
SHEET TITLE
DEMO KITCHEN PLAN

A201
SHEET

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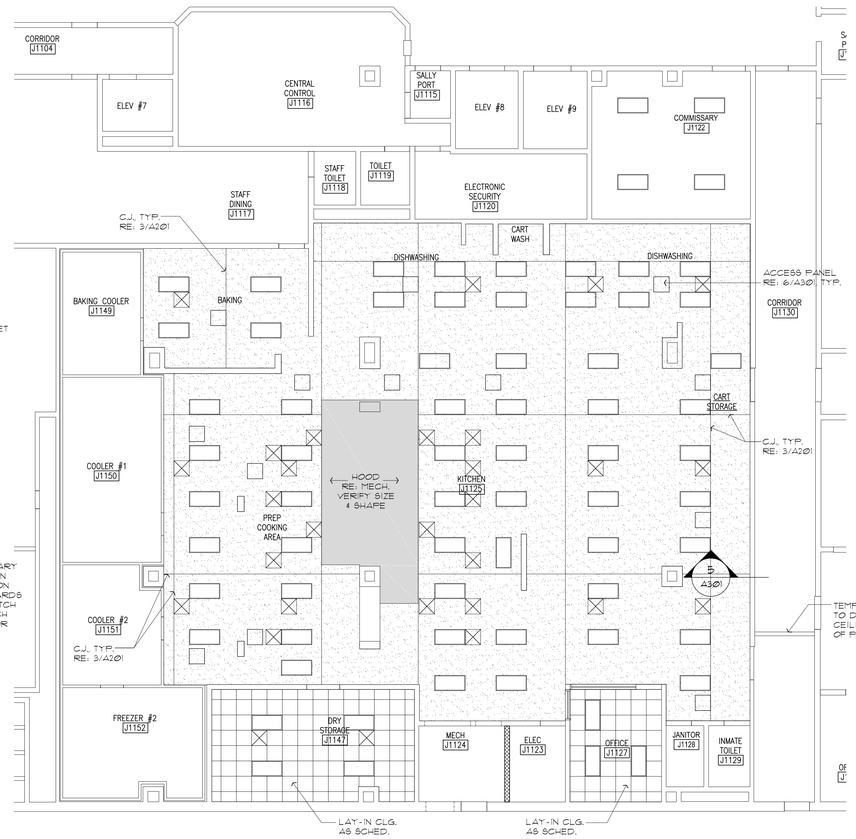
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1 KITCHEN PLAN

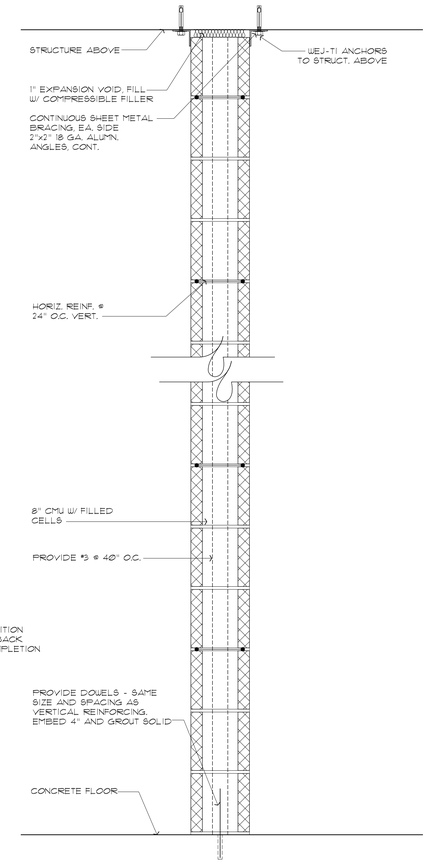
1/8" = 1' -0"

INDICATES (N) FLOOR TOPPING



2 REFLECTED CEILING PLAN

1/8" = 1' -0"



3 INTERIOR PARTITION

1-1/2" = 1' -0"

KITCHEN FLOORING NOTES

1. CONTRACTOR TO COORDINATE INSTALLATION OF NEW FLOORING AT EXISTING AND NEW DRAINS THROUGHOUT THE KITCHEN TYP., AND TO INSURE THAT FLOORS DRAIN POSITIVELY TO EXISTING AND PROPOSED FLOOR DRAINS.

2. CONTRACTOR TO COORDINATE INSTALLATION OF NEW FLOOR COATING WITH ALL EXISTING DOORS IN THE KITCHEN. INSTALLATION OF NEW SEALS ON THE BOTTOM OF ALL DOORS, IS PART OF THE CONTRACT, TO INCLUDE FREEZERS AND COOLERS.

3. CONTRACTOR WILL INSTALL TRANSITIONS AT ALL DOORS TO ELIMINATE POTENTIAL TRIPPING HAZARDS THROUGHOUT THE KITCHEN AREA.

4. REMOVAL AND REINSTALLATION OF ALL PLUMBING FIXTURES TO FACILITATE INSTALLATION OF THE FLOORING IS A RESPONSIBILITY OF THE CONTRACTOR.

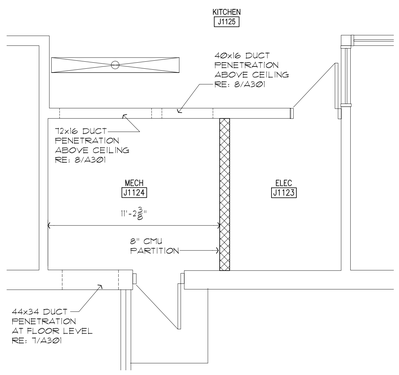
WALL LEGEND

	(D) PARTITION, TO BE REMOVED	
	(E) PARTITION, TO REMAIN	
	(N) PARTITION	DET. 3/A301

ROOM FINISH SCHEDULE

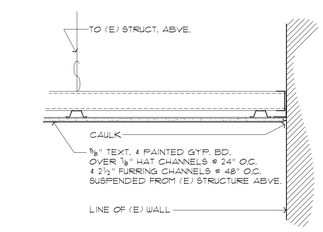
Room		ELECTRICAL J1123	MECHANICAL J1124	KITCHEN J1125	OFFICE J1127	JANITOR J1128	INMATE TOILET J1129	DRY STORAGE J1147	BAKING COOLER J1149	COOLER #1 J1150	COOLER #2 J1151	FREEZER #2 J1152
	DENOTES WALL WHERE FINISH OCCURS / DENOTES SAME FINISH ON ALL WALLS											
FLOOR	EXISTING				○							
	CONCRETE TOPPING			○		○	○	○	○	○	○	
	VINYL COMP. TILE											
	SEALED CONCRETE	○	○									
	BY COOLER SUPPLIER											○
BASE	EXISTING	●	●	⊗	⊗	⊗	⊗	⊗	⊗			
	MATCH EXISTING	●	●									
WALLS	BY COOLER SUPPLIER								⊗	⊗	⊗	⊗
	PAINT	●	●									
CEILINGS	EXISTING					○	○					
	OPEN	○	○									
	CERAMA GUARD NON FISSURED				○			○				
	TEXT. & PAINTED GYP. BD.				○							
	BY COOLER SUPPLIER								○	○	○	○
	Height											
Notes:					1.			1.				

1. PROVIDE HOLD DOWN CLIPS @ EVERY CEILING TILE, TYP.



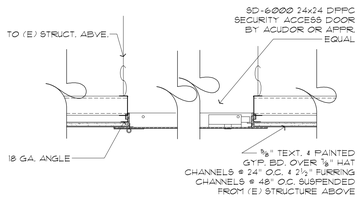
4 ENLARGED PLAN

1/4" = 1' -0"



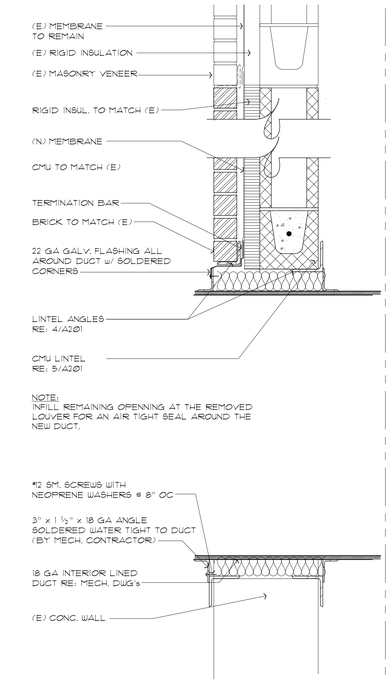
5 CEILING DETAIL

1 1/2" = 1' -0"



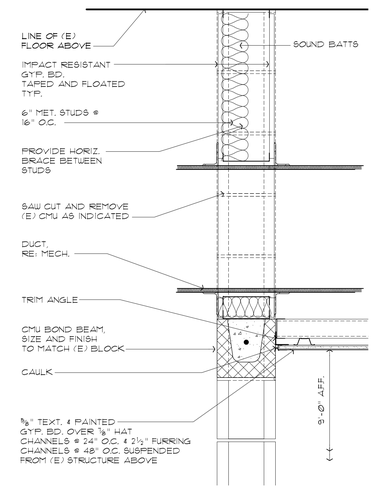
6 CEILING ACCESS DOOR DETAIL

1 1/2" = 1' -0"



7 DUCT PENETRATION

1 1/2" = 1' -0"



8 DUCT PENETRATION

1 1/2" = 1' -0"

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WILLIAMSON COUNTY JAIL RENOVATION

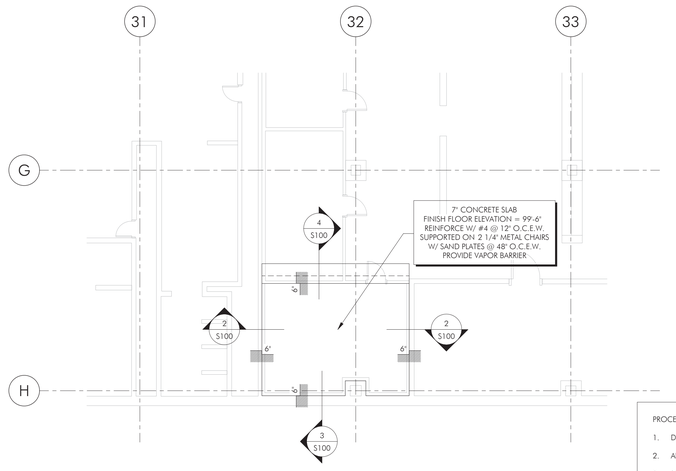
MARK	DATE	DESCRIPTION
	5.22.17	CONSTRUCTION DOCS

PROJECT NO:	22891
DRAWN BY:	CC
DESIGNED BY:	DV
CHECKED BY:	GJ

SHEET TITLE
PROPOSED KITCHEN PLAN

A301
SHEET

Williamson County, Texas
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6/1/2017 8:39 AM



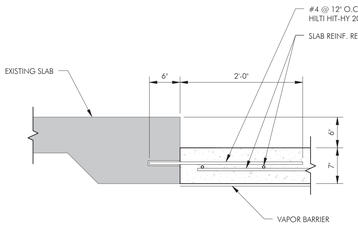
PROCEDURE:

1. DEMOLISH EXISTING SLAB IN AREA SHOWN.
2. ALLOW SOILS TO THAW.
3. REMOVE SOIL AS REQUIRED TO LOWER SLAB AS SHOWN.
4. TEST EXPOSED SOILS FOR SOFT AREAS.
5. REMOVE AND REPLACE ANY IDENTIFIED SOFT AREAS WITH COMPACTED ON-SITE SOILS.
6. REPLACE SLAB AS SHOWN.

PLAN NORTH

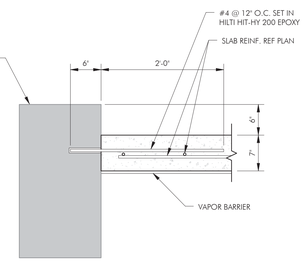
1 FOUNDATION PLAN

1/8" = 1'-0"



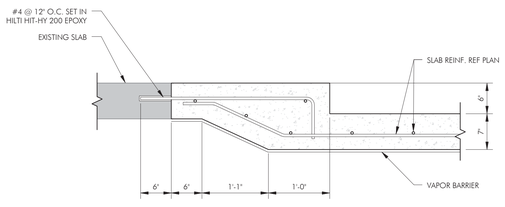
2 SECTION

1" = 1'-0"



3 SECTION

1" = 1'-0"



4 SECTION

1" = 1'-0"

NOT USED

STRUCTURAL NOTES

I. DESIGN DATA

A. BUILDING CODE
INTERNATIONAL BUILDING CODE 2015 EDITION WITH CITY OF GEORGETOWN AMMENDMENTS.

B. DESIGN LOADS

1. Wind Load — Exposure: B; Design Wind Speed: 120 MPH; Risk Category: III
2. Roof Loads — Live Load (L.L): 20 PSF**; Dead Load (Design) (D.L): 20 PSF
3. Floor Loads — Live Load: 100 PSF*; Dead Load (Superimposed): 5 PSF; Partitions: 20PSF; Storage Mezzanines: 100 PSF
4. Stairs, public corridors & Lobbies (L.L): 100 PSF

*Reduced Per I.B.C. SEC. 1607.9
** Reduced Per I.B.C. SEC. 1605.3

The contractor shall verify all dimensions and shall coordinate all structural plans and details with the architect before starting work. The engineer shall be notified of any discrepancies prior to construction.

The structural systems of the floor and roof are designed to perform as a complete unit. During demolition and repair of these structures, structural components may be unstable and it is the responsibility of the contractor to provide temporary shoring and/or bracing as required for the stability of the incomplete structure and for the safety of all on-site personnel.

C. ALTERNATE DESIGNS

Alternate structural systems & details will only be considered, provided they are submitted with calculations certified by a Professional Engineer Registered in the State of the project. The calculations must show the equivalency of the alternate & acceptance of the alternate by the engineer must be in writing.

D. FUTURE EXPANSION

This project is not designed for future expansion.

E. Contractor to verify all conditions at the jobsite and report any discrepancies to the engineer prior to start of any construction.

II. FORMS

1. Materials:
   A. Lumber: All lumber and plywood used in the construction of forms for concrete shall be sound, clean and free of surface imperfections, and of sufficient size and thickness to rigidly support the loads involved.
   B. Plywood: Form plywood shall be sound and free of surface imperfections, and shall be manufactured with exterior glue suitable for use in forming concrete.
   C. Accessories: Form ties, clamps and other accessories shall be of such type, size, etc. as will safely support the loads to be encountered. Accessories on exposed faces shall be such as will not leave exposed metal on concrete face.
   D. Form Coating: Equal to Sonneborn Formsaver.
2. Application:
   A. The contractor shall employ an experienced surveyor to supply all necessary lines and levels to insure that all finished concrete work is properly located, straight, true and square.
   B. All vertical concrete surfaces shall be formed with wood, including edges of walks, slabs on grade, steps on grade and exposed portions of grade beams. If the earth will stand vertical and firm during excavating and concreting, no forms need to be constructed for concrete below grade.
   C. Form construction and removal shall conform to the recommendations and requirements of the appropriate sections of ACI Standard 347 and ACI Code 318, latest versions. All form work shall be placed straight, level, plumb and true to line, sufficiently supported, braced and tied to rigidly support the loads involved without movement, and constructed to maximize resistance to shortening of the member. All joints in form work shall be tight an neat to prevent leakage or irregularities in exposed surfaces.
   D. The contractor shall check with all other trades and make certain that all piping, conduit, sockets, inserts, sleeves, anchors, coils, etc., required by the various trades are properly placed and supported to prevent movement during concreting.
   E. The contractor shall obtain the Architect's and the Engineer's review and okay before placing any structural concrete, giving at least 48 hours notice before pours are scheduled. Obtain the Architect's approval before pouring non-structural concrete.
   F. The contractor shall construct form work to adequately support pressure from the wet concrete. Reinforcing shall be installed to the Engineer's satisfaction before placing concrete.
   G. Thoroughly clean all form surfaces in contact with concrete and coat with approved form coating. Oiled forms shall not be used for exposed concrete surfaces which are later to be plastered or rubbed.
   H. Leave all form work in place for a time consistent with recommendations of the American Concrete Institute. In general, the perimeter vertical beam forms may be removed within 24-28 hours after concrete is placed. Should inconsistencies and/or irregularities on the lines, levels or plumb of the concrete occur, the contractor shall make such corrections as the engineer directs, without extra cost to the owner.

III. REINFORCING MATERIAL PROPERTIES

	REINFORCING PROPERTIES:	FY, KSI	ASTM
A.	All bars unless noted	60	A615
B.	Ties & stirrups	60	A615
C.	Welded wire fabric (smooth)	65	A185
D.	Post-tensioning strand	270Fpu	A416
E.	Pre-stressing strand	270Fpu	A416
F.	Weldable rebar	60	A706

IV. EXPANSION AND CONTROL JOINTS

A. Control joins are to encompass an area not greater than 400 sq. ft. The minimum distance between control joints is 15'-0". Control joints shall be placed at mid span between grade beams parallel to control joint. Contractor shall submit control joint layout plan for review by architect and engineer prior to construction of slab.

V. CAST IN PLACE CONCRETE

1. Materials
   A. Cement:
      Portland Cement shall conform to the standard specifications for Portland cement, ASTM Designation C-150, latest version Type I or Type III.
   B. Concrete Aggregates:
      Concrete aggregates shall conform to the specifications for Concrete Aggregates, ASTM C-33, latest version Type I or Type III.
   C. Water:
      Water shall be clean, potable and free of injurious amounts of acids, alkalis or organic materials.
   D. Ready Mixed Concrete:
      Ready Mixed Concrete shall conform to ASTM Specifications C-94, latest version.
   E. Expansion joints (if shown):
      Pre-molded joint filler shall consist of asphalt vegetable fiber and mineral filler between two sheets of asphalt saturated paper and shall meet the requirements of ASTM Specification D-994, latest version.
   F. Admixtures:
      Chemical compounds shall be used as an Admixture to control plastic shrinkage, improved workability and entrain 3 to 5% air. The Admixtures shall contain no chlorides, fluorides or nitrates and shall be formulated by the manufacturer for the job area and weather conditions to control setting time. Admixtures shall conform to ASTM Specifications C-260 and C-494, latest versions. The Admixtures intended for use shall be submitted to the Engineer for approval before any actual mix is made.
2. Place concrete in compliance with practices and recommendations of ACI 304.
   A. Cold Weather Placing: Comply with ACI 306.
   B. Hot Weather Placing: Comply with ACI 305.
   C. Batching, Mixing & Delivery: Comply with ACI C94.
3. ALL CONCRETE SHALL BE CONSOLIDATED BY USE OF A MECHANICAL VIBRATOR.
4. The maximum time interval between the addition of mixing water and/or cement to the batch, and the placing of the last of the concrete batch in the forms shall not exceed ninety (90) minutes for ambient temperatures below 90 degrees and sixty (60) minutes for ambient temperatures of 90 degrees and above.
5. No concrete shall be placed where the concrete temperature exceeds 90 degrees Fahrenheit, before any water is added at the jobsite.
6. Reinforcing bars shall be designed, fabricated and placed in accordance with the latest ACI Specifications.
7. Continuous reinforcing bars shall have a minimum lap of 40 diameters or 24", whichever is greater.
8. Provide corner bars for all continuous reinforcing bars at all corners with minimum lap of 40 diameters or 24", whichever is greater.
9. Welded Wire Fabric (W.W.F.) shall conform to ASTM A185.
10. Non-shrink grout shall be ready-to use metallic aggregate product requiring only additions of water at the site, and shall have the following attributes:
    A. Be capable of producing a flowable grouting material having no drying shrinkage or settlement at any age.
    B. The compressive strength of the grout (50mm or 2" cubes) shall be not less than 5,000 psi at age 28 days. Store, mix and place non-shrink grout in strict accordance with manufacturer's recommendations, as approved by the Engineer.
11. Provide 1/2" pre-molded expansion joints where new concrete walks about the building, existing curbs and walks.
12. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to form seams or planes of weakness within the section.
13. Where a section cannot be placed continuously, provide construction joints as approved by the Engineer.
14. Place concrete at such a rate that concrete which is being integrated with fresh concrete is still plastic.
15. Deposit concrete as nearly as practicable in its final location to avoid segregation due to re-handling and flowing. Do not subject concrete to any procedure which might cause segregation. Do not use mechanical vibrators to move concrete.
16. Screed concrete which is to receive other construction to the proper level to avoid excessive shimming and grouting.
17. Do not use concrete that has become non-plastic and unworkable, or does not meet the required quality control limits or which has been contaminated by foreign materials.
18. Do not re-temper concrete after initially obtaining the proper slump on any load of concrete.
19. All reinforcing shall be supported on metal supports and securely tied to prevent movement during concreting.
20. All concrete shall be designed and constructed in accordance w/ IBC Chapter 19 & ACI-318, latest editions.
21. Provide extra reinforcing on each face around all openings 24" or larger in all slabs & walls equal to half the interrupted reinforcing bars on each side but not less than 2
    - #5 bars with Class B lap but not less than 2 feet beyond edge openings.
22. Provide a 3/4" chamfer on all exposed corners of concrete.
23. The following minimum concrete cover shall be provided for reinforcement:

		MINIMUM COVER IN.
A.	Concrete cast against & permanently exposed to earth:	3"
B.	Concrete exposed to earth or weather:	
	#6 THRU #18 bars	2"
	#5 & smaller bars	
C.	Concrete not exposed to weather or in contact with ground:	
	slabs & walls: #14 & #18 bars	1-1/2"
	#11 & smaller bars	2"
	Beams & Columns:	1"
	Primary reinforcement, ties & stirrups	1"

24. If any ponds, tree wells or abrupt grade changes occur within 5'-0" of perimeter grade beam, the grade beam must be extended a minimum of 12" below the lowest elevation of the grade change.
25. Under-slab vapor barrier shall be StegoWrap 15 mil. Or equal. Vapor retarder shall be installed in accordance with manufacturer's specifications.
26. All anchor bolts and shearwall hold down bolts are to be "wet set". Do not drill any epoxy set hold down or anchor bolts.

VI. CONCRETE MATERIAL PROPERTIES

1. CONCRETE PROPERTIES:

		F'c PSI 28 DAYS	SLUMP INCHES
A.	Footings, piers, grade beams & foundation walls	3000	4 ± 1
B.	Interior slab on grade	3000	5 ± 1
C.	Exterior slab on grade	3000	5 ± 1
D.	Topping & concrete over metal deck	3500	5 ± 1

2. All exterior concrete shall be air entrained to give the concrete on air content of 6 ± 1% by volume.
3. Cast-In-Place concrete shall be regular weight with a minimum compressive strength of 3000 psi at 28 days. The concrete mix design shall have a minimum of 5 sacks of cement for 3000 psi and 5-1/2 sacks for 3500 psi per cubic yard of concrete. The mix design shall be prepared by a testing agency and reviewed by the Engineer prior to placing any concrete. All concrete shall be by one supplier unless approved by the Engineer. The use of Fly Ash is not permitted.
4. Concrete shall have a maximum slump of 5" for slabs and 4" for all other concrete.

VII. USE AND/OR RELEASE OF STRUCTURAL ENGINEERING ELECTRONIC FILE

The electronic files for the structural engineering documents will not be released for use during construction or for the preparation of shop drawings or submittals. Each supplier or fabricator is responsible for reproducing the information required for their submittal. The duplicating of any part of these documents for inclusion in shop drawings or submittals is also prohibited.

VIII. DETAIL NOTES

Details noted as typical shall apply in all cases unless specifically shown or noted otherwise.

IX. STRUCTURAL REQUIREMENTS FOR SUBMITTALS

The following are submittals required by Engineer. Use plans and spec. book for product list.

1. Select fill material
2. Soil compaction test results
3. Reinforcement & concrete accessories including vapor barrier
4. Concrete mix design
5. Concrete test results

X. STRUCTURAL REQUIREMENTS FOR SITE VISITS

Site visits for construction observation will not be made by Engineer until all submittals and/or testing results have been reviewed and accepted by the Engineer. Contractor is responsible for scheduling submittals to allow the Engineer adequate time to review and comment before proceeding with construction.

Representative of Engineering 360 will visit the site at the following stages of construction:

A. After forms, rebar, embeds and other accessories are in place and 48 hours prior to placement of concrete

Please refer to specifications or General Notes for project specific instructions.

Contractor shall issue to the engineer a complete project schedule with the above site visits noted and notify the Engineer a minimum of 48 hours prior to the scheduled visit to confirm time and date required visit. Failure of the Contractor to accomplish this notification will not require the engineer to respond on shorter notice, nor will the Contractor proceed without the Engineer performing appropriate site visit. Additionally if the Contractor requests or schedules a site visit and construction is not at the appropriate stage for the Engineer to perform the proper observations, another site visit will be required and scheduled at the Contractor expense for all time and travel expenses of the engineer or his representative. Engineer will not issue any type or form of compliance or concurrence statement for construction without performing the above noted site observations.

Statement of Special Inspections Per IBC 2012 Chapter 17

Per Section 1704.2.3: The applicant shall submit a statement of special inspection in accordance with Section 107.1 as a condition of permit issuance. The statement shall be in accordance with Section 1704.3.

PROJECT ADDRESS: 306 W. 4th Street
CITY, STATE: Georgetown, Texas

SECTION 1705: REQUIRED VERIFICATION AND INSPECTION

Section 1705 of the International Building Code 2015, the following is a list of the required special inspections applicable for this project:

2012 IBC SECTION	INSPECTION/ ASSURANCE	TYPE OF SPECIAL INSPECTION AND EXTENT	APPLICABLE	NON APPLICABLE
1705.2	AISC 360	Steel Construction		X
1705.2.2	IBC TABLE 1705.2.2	Steel Construction Other Than Structural Steel		X
1705.2.2.1.1	AWS D1.3	Cold-Formed Welding Inspection		X
1705.2.2.1.2	AWS D1.4 and ACI 318	Reinforced Steel Welding Inspection		X
1705.2.2.2	Indicated in Section	Cold-Formed Steel Trusses Spanning 60 Feet or Greater		X
1705.3	IBC TABLE 1705.3	Concrete Construction	X	
1705.4	Inspection: TMS 420/ACI 530/ASCE 5 Assurance: TMS 602/ACI 530.1/ASCE 6	Masonry Construction		X
1705.5	Indicated in Section	Wood Construction: High-Load Diaphragm/Metal-Plate-Connected Wood Trusses Spanning 60 Feet or Greater		X
1705.6	Indicated in Section	Soils		X
1705.7	Indicated in Section	Driven Deep Foundations		X
1705.8	Indicated in Section	Cast-in-Place Deep Foundations (Piers)		X
1705.9	Indicated in Section	Helical Pile Foundations		X
1705.10	Indicated in Section	Special Inspection for Wind Resistance		X
1705.11	Indicated in Section	Special Inspection for Seismic Resistance		X
1705.12	Indicated in Section	Testing and Qualification for Seismic Resistance		X
1705.13	Indicated in Section	Sprayed Fire-Resistance Materials		X
1705.14	AWCI 12-B	Mastic and Intumescent Fire-Resistance Coatings		X
1705.15	Indicated in Section & ASTM E 2570	Exterior Insulation and Finish Systems/Water-Resistive Barrier Coating		X
1705.16	Indicated in Section	Fire-Resistance Penetrations and Joints		X
1705.17	Indicated in Section	Special Inspection for Smoke Control		X

Special Inspection Reports are to conform to the requirements stoed in Section 1704.2.4.

Exceptions of Special Inspection as permitted per Section 1704.2

1. Special inspections are not required for construction of a minor nature or as warranted by conditions in the jurisdiction as approved by the building official.
2. Unless otherwise required by the building official, special inspections are not required for
3. Group U.
   Special inspections are not required for portions of structures designed and constructed in accordance with the cold-formed steel light-frame construction provisions of IBC Section 2211.7 or the conventional light-frame construction provisions of IBC Section 2308.

Additional Special inspections shall also be required for proposed work that is, in the opinion of the building official, unusual in nature.

Additional Special Inspection per International Building Code 2012, the following is a list of the required special inspections applicable for this project:

2012 IBC SECTION	DETAILS	TYPE OF SPECIAL INSPECTION AND EXTENT	APPLICABLE	NON APPLICABLE
1706		Design Strengths of Materials		X
1707		Alternative Test Procedures		X
1708		Test Safe Load		X
1709		In-Situ Load Tests		X
1710		Preconstruction Load Tests		X
1711		Material and Test Standards		X

Per Section 1704.5 Structural Observations:

Prior to the commencement of observations, the structural observer shall submit to the building official a written statement identifyingthe frequency and extent of structural observations.

At the conclusion of work included in the permit, the structural observer shall submit to the building official a written statement that the site visits have been made and identified any reported noting deficiencies which, to the best of the structural observer's knowledge, have not been resolved.

LAURENCE J. FISHER 50110 REGISTERED PROFESSIONAL ENGINEER
3/27/17

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY LARRY J. FISHER, P.E. 50110.

THIS DRAWING ISSUED FOR CONSTRUCTION. THE DRAWING MAY NOT BE MODIFIED WITHOUT THE EXPRESS WRITTEN CONSENT OF THE ENGINEER, AND THEN ONLY IN ACCORDANCE WITH THE RULES OF THE TEXAS ENGINEERING PRACTICE ACT.

360 ENGINEERING INC

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Round Rock, TX 78665
Phone (512) 244-1966
Fax (512) 388-3698
TBPE Registration No. F-12702
JOB NO.: 17020
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"Bringing Structure to the world"

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6300 La Calma, Suite 100
Austin, Texas 78752
Texas Firm #F-2578
Ph: 512.451.6579 Fax: 512.451.6678

THE WALLACE GROUP, INC.
ENGINEERS
ARCHITECTS
PLANNERS
SURVEYORS
WACO, TEXAS

STATE OF TEXAS — Thomas R. Alexander — 5.22.17 — REGISTERED PROFESSIONAL ENGINEER

WILLIAMSON COUNTY JAIL RENOVATION

306 W. 4TH STREET
GEORGETOWN, TX 78626

5.22.17 CONSTRUCTION DOCS

MARK	DATE	DESCRIPTION

PROJECT NO:	1602_2
DRAWN BY:	JS
DESIGNED BY:	LF
CHECKED BY:	LF

SHEET TITLE
FOUNDATION PLAN

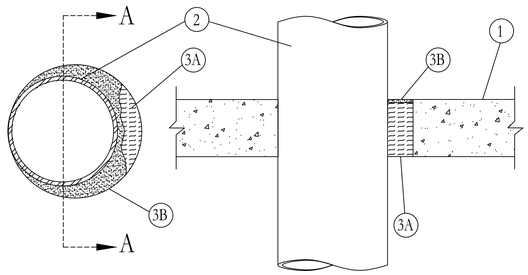
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SHEET

Williamson County Texas

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p. 309
6/9/2017 8:39 AM

Bid 17105-166

System No. C-AJ-1338
August 23, 2004
F Rating - 2 Hr
T Rating - 0 Hr
W Rating - Class I (See Item 3)



SECTION A-A

1. Floor or Wall Assembly - Min 2-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete.

2. Through Penetrants - One metallic pipe or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between tube and periphery of opening shall be min 0 in. to max 1-7/8 in. Penetrants to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes or tubing may be used:

   A. Steel Pipe - Nom 24 in. diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. Iron Pipe - Nom 24 in. diam (or smaller) cast or ductile iron pipe.
   C. Conduit - Nom 6 in. diam (or smaller) steel conduit, or nom 4 in. (or smaller) steel electrical metallic tubing.
   D. Copper Tubing - Nom 6 in. diam (or smaller) Type M (or heavier) copper tube.
   E. Copper Pipe - Nom 6 in. diam (or smaller) Regular (or heavier) copper pipe.

3. Firestop System - The details of the firestop system shall be as follows:

   A. Packing Material - Min 2-1/4 in. thickness of min 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material.

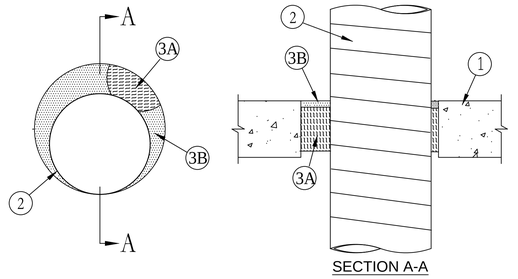
   B. Fill,Void or Cavity Materials* - Caulk or Sealant - Min 1/4 in. thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall. Min 1/2 in. diam bead of caulk applied to the penetrant/concrete interface at the point contact location on the top surface of floor or both surfaces of wall.

   3M COMPANY - FB-3000 WT sealant.
   (The W Rating applies only when FB-3000 WT is used.)

   *Bearing the UL Classification Mark

A FIRESTOPPING ASSEMBLY
NOT TO SCALE

System No. C-AJ-7081
May 19, 2005
F Rating - 2 Hr
T Rating - 0 Hr
W Rating - Class I (See Item 3)



SECTION A-A

1. Floor or Wall Assembly - Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600- 2400 kg/m3) concrete.

2. Through Penetrant - One steel duct to be installed either concentrically or eccentrically within the firestop system. An annular space of min 1/2 in. to max 1-1/2 in. (13 mm to max 38 mm) is required within the firestop system. Steel duct to be rigidly supported on both sides of floor or wall assembly. The following sizes of steel ducts may be used:

   A. Steel Duct - Nom 16 in. (406 mm) diam (or smaller) No. 24 gauge (or heavier) spiral wound galv steel duct.
   B. Steel Vent Duct - Nom 10 in. (254 mm) diam (or smaller) No. 28 gauge (or heavier) galv steel vent duct.

3. Firestop System - The firestop system shall consist of the following:

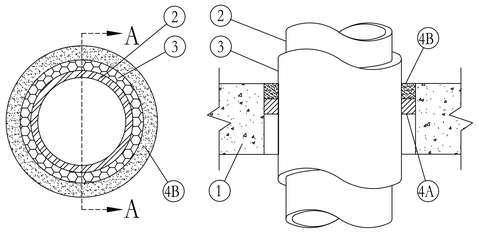
   A. Packing Material - Min 3-1/2 in. (89 mm) thickness of min 4 pcf (64 kg/m3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall to accommodate the required thickness of fill material. In floors constructed of hollow-core concrete, packing material to be recessed from top and bottom surfaces of floor as required to accommodate the required thickness of fill material.
   B. Fill Void or Cavity Materials* - Caulk or Sealant - Min 1/2 in. (13 mm) thickness of caulk applied within the annulus, flush with top surface of floor or with both surfaces of wall. In floors constructed of hollow-core concrete, min 1/2 in. (13 mm) thickness of caulk applied within the annulus, flush with top and bottom surfaces of floor. resistance of through penetrant (Item 2) must be considered in addition

   3M COMPANY - FB-3000 WT sealant.
   *Bearing the UL Classification Mark

B FIRESTOPPING ASSEMBLY
NOT TO SCALE

NOTE: OTHER FIRESTOP ASSEMBLIES USING DIFFERENT PRODUCTS AND DIFFERENT MANUFACTURERS MAY BE ACCEPTABLE PROVIDING:
1. THEY ARE APPROPRIATE
2. THEY HAVE A U.L.LISTING
3. THEY ARE PROPERLY SUBMITTED

System No. C-AJ-5001
June 15, 2005
F Ratings - 1-1/2, 2 and 3 Hr (See Item 4)
T Ratings - 0, 1/2, 3/4 and 1 Hr (See Items 1A and 4)
L Rating At Ambient - 2 CFM per sq ft
L Rating At 400 F - less than 1 CFM per sq ft



SECTION A-A

1. Floor Wall Assembly - Min 2-1/2 in. (64 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) concrete. Max diam of opening is 18 in. (457 mm).

1A. Steel Sleeve (Optional, not shown) - Nom 10 in. (254 mm) (or smaller) Schedule 10 (or heavier) steel sleeve cast or grouted into floor or wall assembly. Sleeve may extend a max of 2 in. (51 mm) above top of floor or beyond either surface of wall.

T Rating is 0 Hr when sleeve is used.

2. Through Penetrant - Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper pipe, nom 12 in. (305 mm) diam (or smaller) service weight (or heavier) cast iron soil pipe, nom 12 in. (305 mm) diam (or smaller) Class 50 (or heavier) ductile iron pressure pipe or nom 12 in. (305 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe centered in the opening and rigidly supported on both sides of the floor assembly.

3. Pipe Covering* - Nom 1/2 in. to 2 in. (13 mm to 51 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m3) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied selfsealing lap tape. Transverse joints secured with metal fasteners or with butt strip tape supplied with the product.

   See Pipe and Equipment Covering - Materials* (BRGU) category in Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

4. Firestop System - The details of the firestop system shall be as follows:

   A. Packing Material - Min 1 in. (25 mm) thickness of firmly packed mineral wool batt insulation used as a permanent form. Packing material to be recessed from top surface of floor or sleeve as required to accommodate the required thickness of caulk fill material (Item B).
   B. Fill,Void or Cavity Material* - Caulk or Sealant - Applied to fill the annular space flush with the top surface of the floor or sleeve. When nom pipe covering thickness is 2 in. (51 mm), min thickness of caulk fill material is 2 in. (51 mm). When nom pipe covering thickness is 1-1/2 in (38 mm) or less, min thickness of caulk fill material is 1 in. (25 mm)

   The hourly F and T Ratings of the firestop system are dependent upon the thickness of the floor, the size of pipe, the thickness of pipe covering material and the size of the annular space (between the pipe covering material and the edge of the circular through opening), as shown in the following table

Min Floor or Wall Thkns in. (mm)	Max Pipe Diam in. (mm)	Nom Pipe Covering Thkns in. (mm)	Annular Space in. (mm)	F Rating Hr	T Rating Hr
2-1/2 (64)	4 (102)	1 or 1-1/2 (25 or 38)	1/2 to 2-3/8 (13 to 60)	2	1
4-1/2 (114)	4 (102)	2 (51)	1/4 to 3-5/8 (6 to 92)	2	1-1/2
2-1/2 (64)	12 (305)	1 (25)	1/2 to 1-1/2 (13 to 38)	2	1/2
4-1/2 (114)	12 (305)	1 (25)	1/2 to 2-3/8 (13 to 60)	3	1
2-1/2 (64)	12 (305)	1/2 (13)	1/2 to 2-3/8 (13 to 60)	2	0

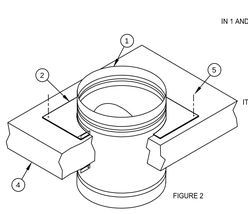
3M COMPANY - FB-3000 WT sealant.

*Bearing the UL Classification Marking

C FIRESTOPPING ASSEMBLY
NOT TO SCALE

GENERAL INSTALLATION

IN 1 AND 2 HR RATED MASONARY FLOORS



ITEM. DESCRIPTION
1. ROUND FIRE DAMPER
2. RETAINING PLATE, 20 GA. STEEL
3. DUCT
4. MASONARY FLOOR CONSTRUCTION
5. #10 CONCRETE ANCHOR
6. 4" DRAW BAND
7. EXPANSION GAP
8. NOT SHOWN - PROVIDE U.L. LISTED ACCESS DOOR IN EXHAUST DUCT ABOVE FLOOR

FIGURE 2

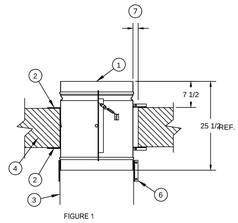
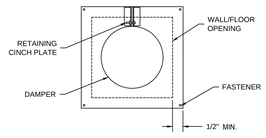
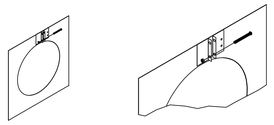


FIGURE 1

NOTE : DO NOT INSTALL FIRESTOPING CAULK OR SEALANT ON FIRE DAMPER

RETAINING "CINCH" PLATE





1. **Expansion Gap**
   A **square** opening in wood or metal stud walls or masonry walls and floors shall be a minimum of 1" (25) and a maximum of 2½" (64) larger than the damper diameter. A **round** opening in masonry walls or floors shall be a minimum of 1" (25) and a maximum of 2½" (64) larger than the damper diameter.
   THE RETAINING "CINCH" PLATE MUST OVERLAP THE OPENING A MINIMUM OF ½" (13).
2. **Damper Sleeve**
   The sleeve is integral to the damper and shall be of equal to or heavier than the gage of the duct as described in NFPA90A and as defined by the appropriate SMACNA duct construction standard.
3. **Damper Orientation**
   The leading edge of the blade in the closed position must be within the plane of the wall. Vertical installation is illustrated and horizontal is similar (see General Installation). The damper may be installed with up to a 30 degree variance of the axle being horizontal (see Blade Orientation section). Approved with airflow in any direction.
4. **Retaining "Cinch" Plates**
   DO NOT PLACE CINCH PLATES IN GROOVE
   Place retaining cinch plates around the damper sleeve and "cinch" against the sleeve with the screw provided on the cinching device (see "Cinch" Plate section). The plates are designed to grab and hold the sleeve while mounting flush against the wall or floor retaining the damper securely in the opening. The plates must overlap the opening a minimum of ½" (13) (see "Cinch" Plate section).
   The "Cinch" plates are fastened to the wall or floor according to the following:
   - Masonry Floor -- "Cinch" plate required on both sides of the floor fastened to the floor with a minimum of 1 ¼" (6) #10 masonry screw.
5. **Duct/Sleeve Connections**
   Round break-away connections must be used. ~~Either~~ a 4" (102) wide drawband ~~or #10 sheet metal screws spaced equally around the circumference of the ducts as follows:~~
   ~~— Duct diameters 20" (559) and smaller – 3 screws.~~
   ~~— Duct diameters over 20" (559) to 24½ (610) – 5 screws.~~
   Note: ~~When~~ optional sealing of these joints is desired, the following sealants ~~may be~~ applied in accordance with the sealant manufacturer's instructions: Hardcast, Inc. - Iron Grip 601, Precision - PA2084T, ECO Duct Seal 44-52 or Design Polymerics - DP 1010
6. **Installation and Maintenance**
   Do not compress or stretch the damper frame into the duct or opening. Lift or handle the damper using sleeve or frame. Do not lift damper using blade. Each fire damper should be examined on a regular basis to ensure it is not rusted or blocked. Consult NFPA for recommendations on maintenance and testing intervals. Care should be exercised to ensure that such tests are performed safely and do not cause system damage.

D ROUND FIRE DAMPER FLOOR INSTALLATION
NOT TO SCALE

NOTES :

1. THE FIRE DAMPER DETAIL ABOVE IS FROM ONE MANUFACTURER, RUSKIN. OTHER FIRE DAMPER MANUFACTURER'S WITH U.L. LISTINGS ARE ACCEPTABLE WITH APPROVED SUBMITTAL. FOLLOW DAMPER MANUFACTURER'S INSTALLATION INSTRUCTIONS

2. DO NOT INSTALL ANY FIRESTOPPING MATERIAL, CAULK, OR SEALANT TO COMPONENTS OF FIRE DAMPER.

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WILLIAMSON COUNTY JAIL RENOVATION

306 W. 4TH STREET
GEORGETOWN, TX 78626

MARK	DATE	DESCRIPTION
	5.22.17	CONSTRUCTION DOCS

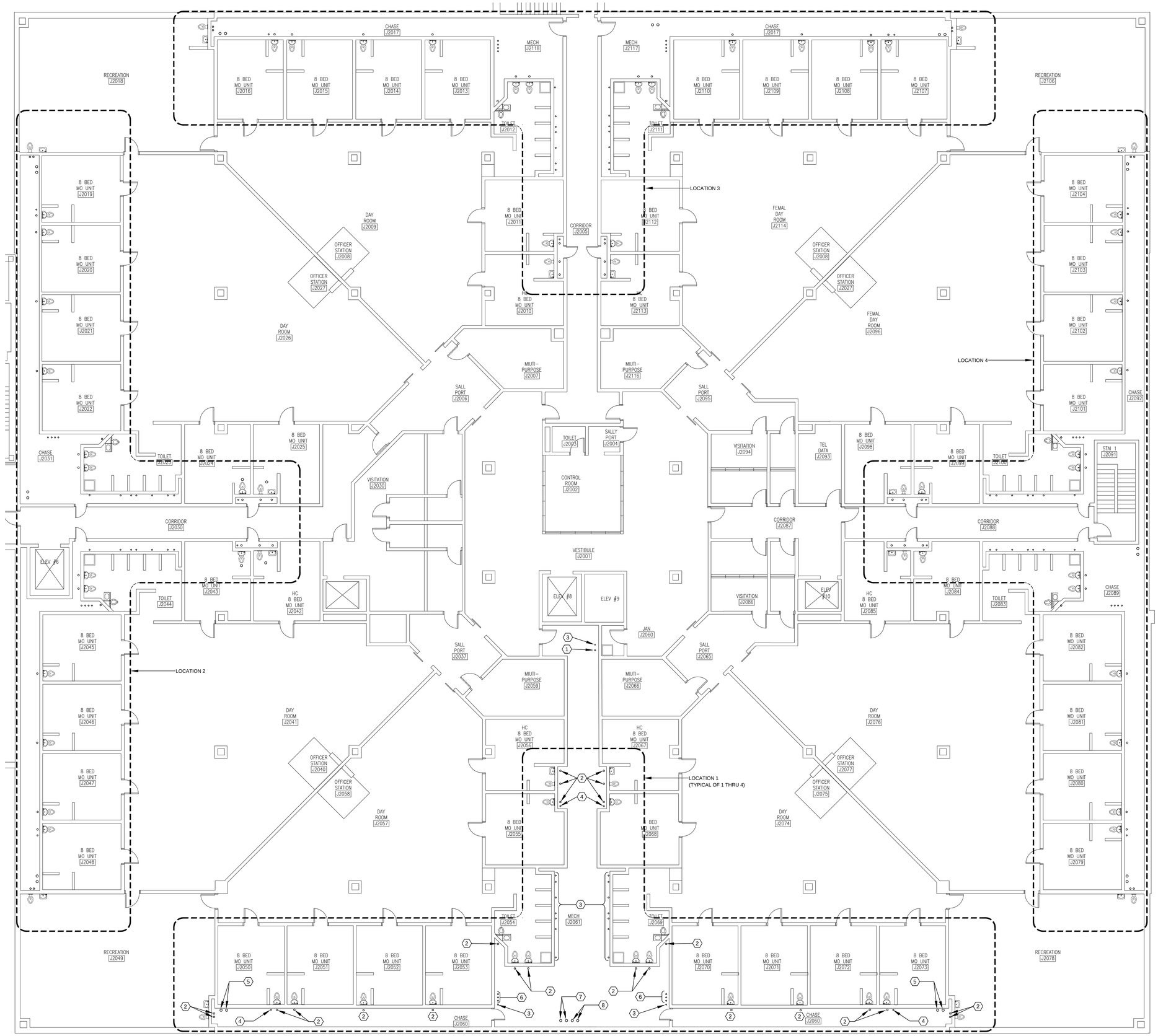
PROJECT NO:
DRAWN BY: SR
DESIGNED BY:
CHECKED BY: TA

SHEET TITLE
FIRESTOPPING ASSEMBLIES DETAILS

FS101
SHEET

\\Williamson County, Texas

6/1/2017 8:38 AM



KEYED NOTES:

NOTES BELOW INDICATE ITEMS THAT PENETRATE THIS FLOOR'S SLAB AND ARE TO HAVE FIRESTOPPING ASSEMBLIES INSTALLED. REFER TO SHEET FS101 FOR FIRESTOPPING DETAILS

1. 3" CAST IRON WASTE
2. 4" CAST IRON WASTE
3. 2" CAST IRON VENT
4. 3" CAST IRON VENT
5. 6" CAST IRON ROOF DRAIN
6. 3" CW, 2" HW, 1-1/2" HWR, COPPER
7. 2" CHILLED WATER, STEEL
8. 6" EMPTY HOLE

PLAN NORTH

01 FIRESTOPPING PLAN SECOND FLOOR

SCALE: 1/8"=1'0"

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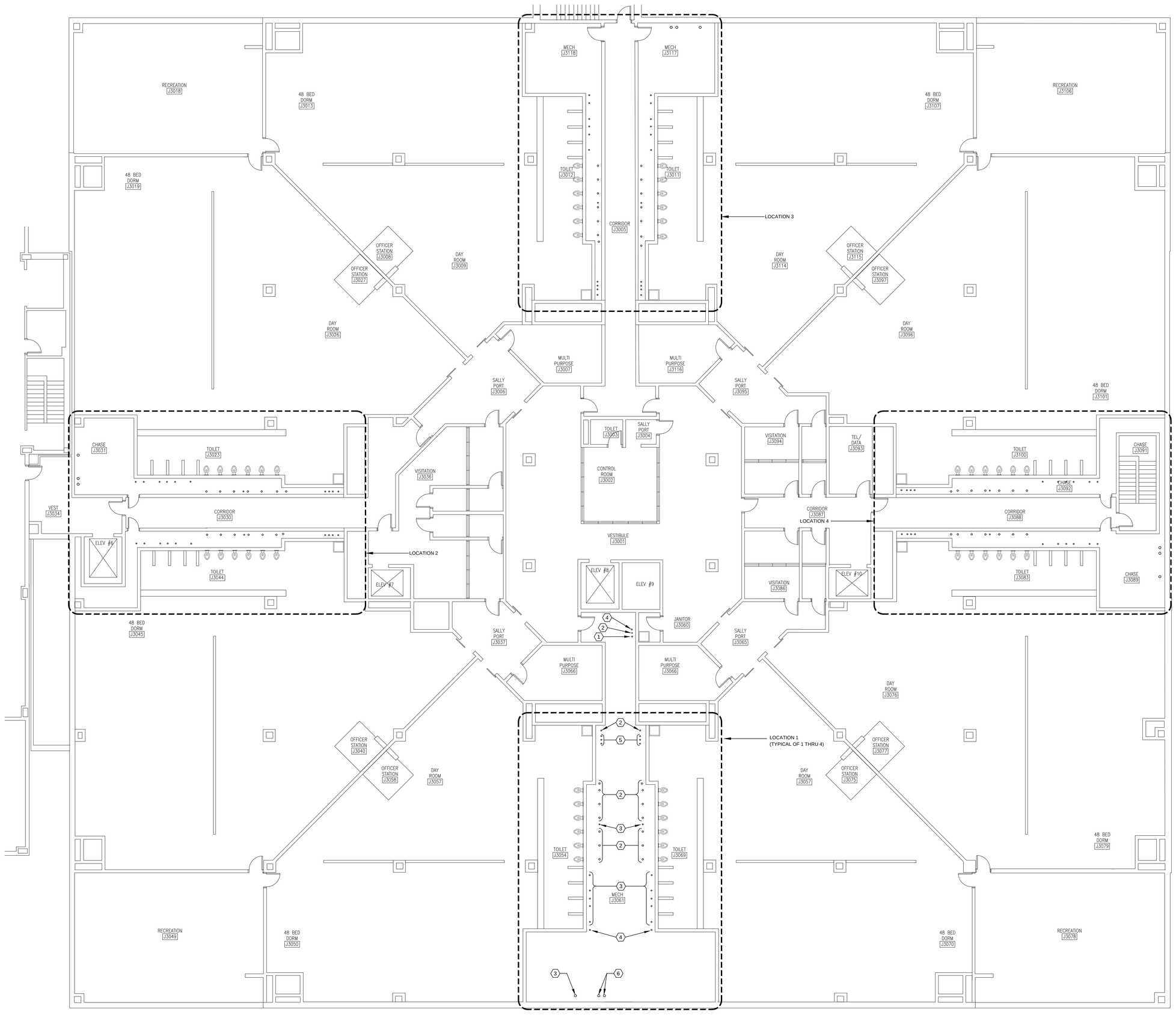
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DRAWN BY: SR
DESIGNED BY:
CHECKED BY: TA

SHEET TITLE
FIRESTOPPING PLAN SECOND FLOOR

FS102
SHEET

Bid 17105-166

Williamson County, Texas



PLAN NORTH

01 FIRESTOPPING PLAN THIRD FLOOR

SCALE: 1/8"=1'0"

KEYED NOTES:

NOTES BELOW INDICATE ITEMS THAT PENETRATE THIS FLOOR'S SLAB AND ARE TO HAVE FIRESTOPPING ASSEMBLIES INSTALLED. REFER TO SHEET FS101 FOR FIRESTOPPING DETAILS

1. 3" CAST IRON WASTE
2. 4" CAST IRON WASTE
3. 2" CAST IRON VENT
4. 3" CAST IRON VENT
5. 2-1/2" CW, 2" HW, 1-1/4" HWR, COPPER
6. 3" CHILLED WATER, STEEL

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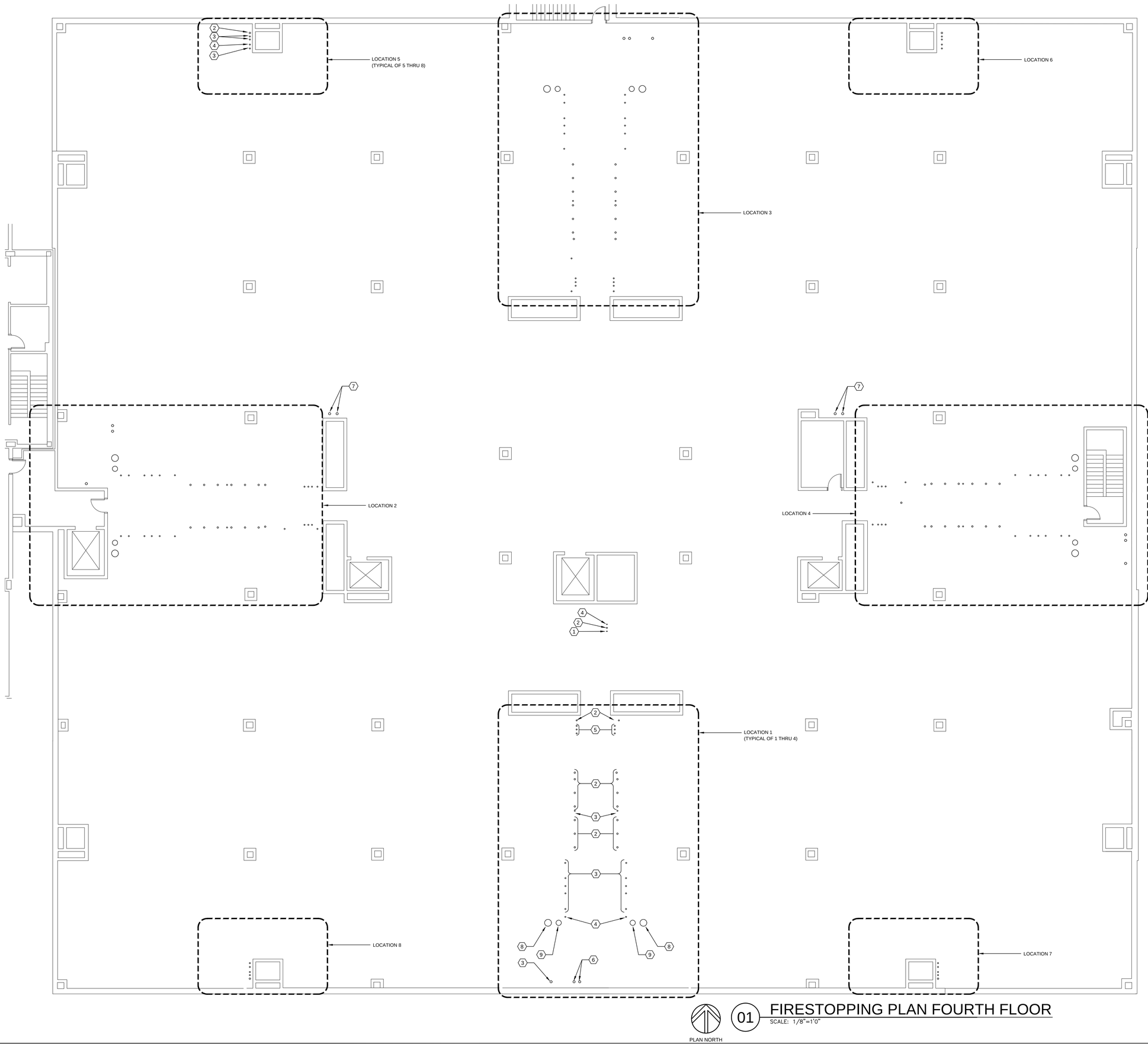
SHEET TITLE
FIRESTOPPING PLAN THIRD FLOOR

FS103
SHEET

6/1/2017 8:38 AM

Bid 17105-186

Williamson County, Texas



KEYED NOTES:

NOTES BELOW INDICATE ITEMS THAT PENETRATE THIS FLOOR'S SLAB AND, UNLESS NOTED OTHERWISE, ARE TO HAVE FIRESTOPPING ASSEMBLIES INSTALLED. REFER TO SHEET FS101 FOR FIRESTOPPING DETAILS

1. 3" CAST IRON WASTE
2. 4" CAST IRON WASTE
3. 2" CAST IRON VENT
4. 3" CAST IRON VENT
5. 2-1/2" CW, 2" HW, 1-1/4" HWR, COPPER
6. 3" CHILLED WATER, STEEL
7. 6" ROOF DRAIN, CAST IRON
8. 18" Ø SMOKE EXHAUST SHEETMETAL DUCT
9. 12" Ø TOILET EXHAUST DUCT, WITH FIRE DAMPER IN FLOOR SLAB. REMOVE OLD FIRE DAMPER AND PROVIDE NEW ONE PER INSTALLATION DETAIL AND MANUFACTURER'S INSTALLATION INSTRUCTIONS. DO NOT INSTALL ANY FIRESTOPPING MATERIAL ONTO FIRE DAMPER.

01 FIRESTOPPING PLAN FOURTH FLOOR
SCALE: 1/8"=1'0"

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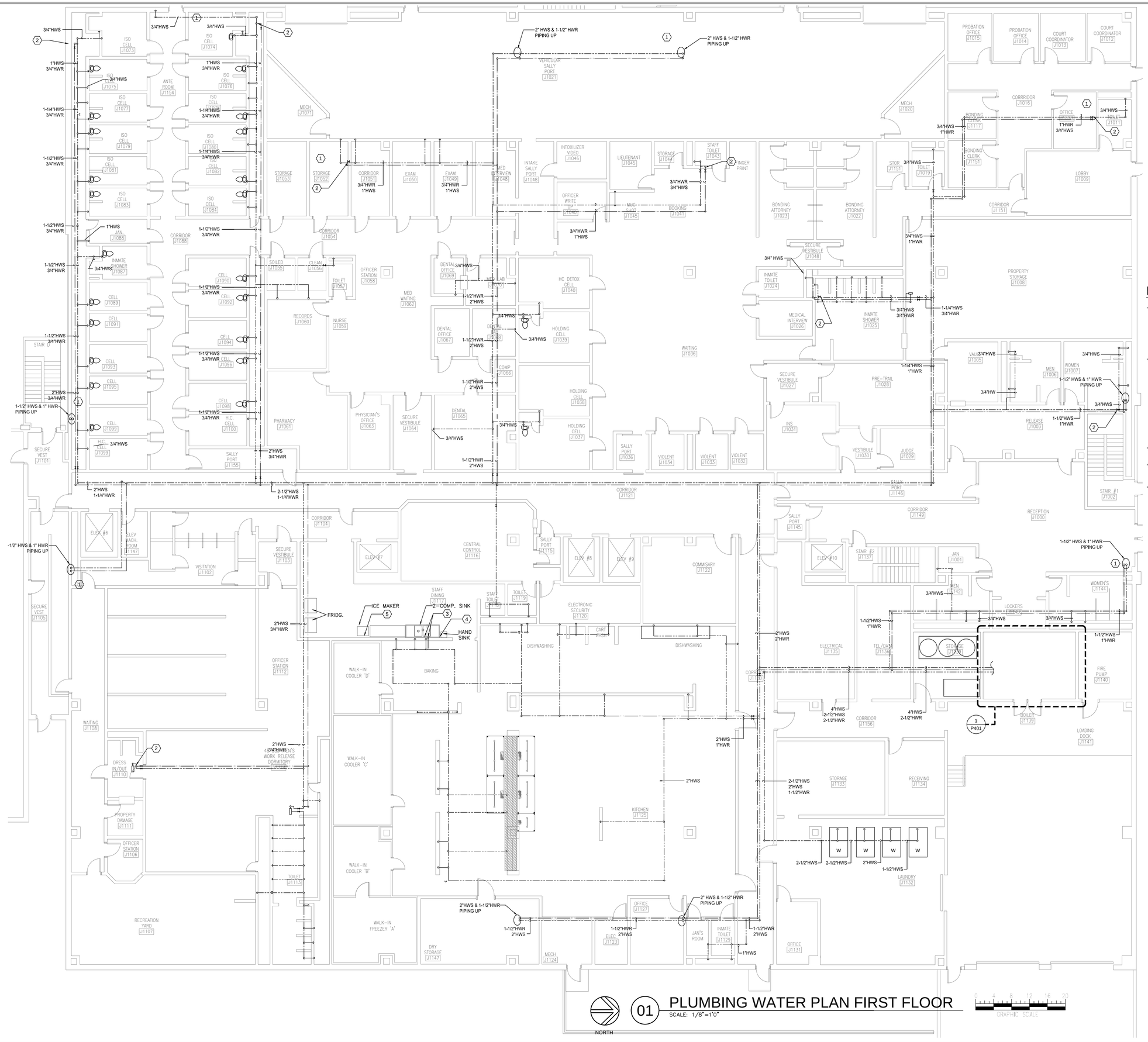
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CHECKED BY: TA

SHEET TITLE
FIRESTOPPING PLAN FOURTH FLOOR

FS104
SHEET

6/1/2017 8:38 AM

Williamson County, Texas



KEYED NOTES:

1. PROVIDE INTERNAL EPOXY PIPE LINER FOR ALL DOMESTIC HOT WATER SUPPLY AND RETURN PIPING SHOWN ON PLAN.. CONTRACTOR SHALL FIELD VERIFY EXISTING BUILDING WATER SYSTEM PRIOR TO BID. LINER SHALL BE SIMILAR TO NU LINE EPOXY COATING MANUFACTURED BY NU-FLOW OR ENGINEER APPROVED EQUAL.
2. PROVIDE 1/2" INLINE, THERMOSTATIC STAINLESS STEEL AUTOMATIC FLOW CONTROL VALVE AT START OF EACH HOT WATER RETURN LINE. VALVE SHALL BE SELF CONTAINED AND FULLY AUTOMATIC WITHOUT ADDITIONAL PIPING OR CONTROL MECHANISMS. PROVIDE CIRCUIT SOLVER VALVES AS MANUFACTURED BY THERM-OMEGA-TECH OR ENGINEER APPROVED EQUAL. VALVE SHALL BE ADJUSTABLE FROM 105T TO 140F. (VALVE SHALL BE NSF CERTIFIED.) ALLOW FOR A TOTAL OF 50 VALVE TO BE INSTALLED. ((NOTER: PROVIDE AN INSTALLED UNIT PRICE FOR ADDITIONAL VALVES AS REQUIRED.)
3. EXISTING HOT WATER SUPPLIES, WITH STOPS, TO REMAIN.
4. EXTEND 1/2" HOT WATER LINES FROM ADJACENT EXISTING WATER SUPPLIES AND MAKE CONNECTIONS TO NEW SINK FAUCET
5. EXTEND 1/2" COLD WATER LINE FROM ADJACENT EXISTING COLD WATER SUPPLY AND MAKE CONNECTION TO NEW ICE MAKER. PROVIDE 1/2" REDUCED PRESSURE ZONE BACKFLOW PREVENTER

01 PLUMBING WATER PLAN FIRST FLOOR

SCALE: 1/8"=1'0"

0 4 8 12 16 20

GRAPHIC SCALE

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WILLIAMSON COUNTY JAIL RENOVATION

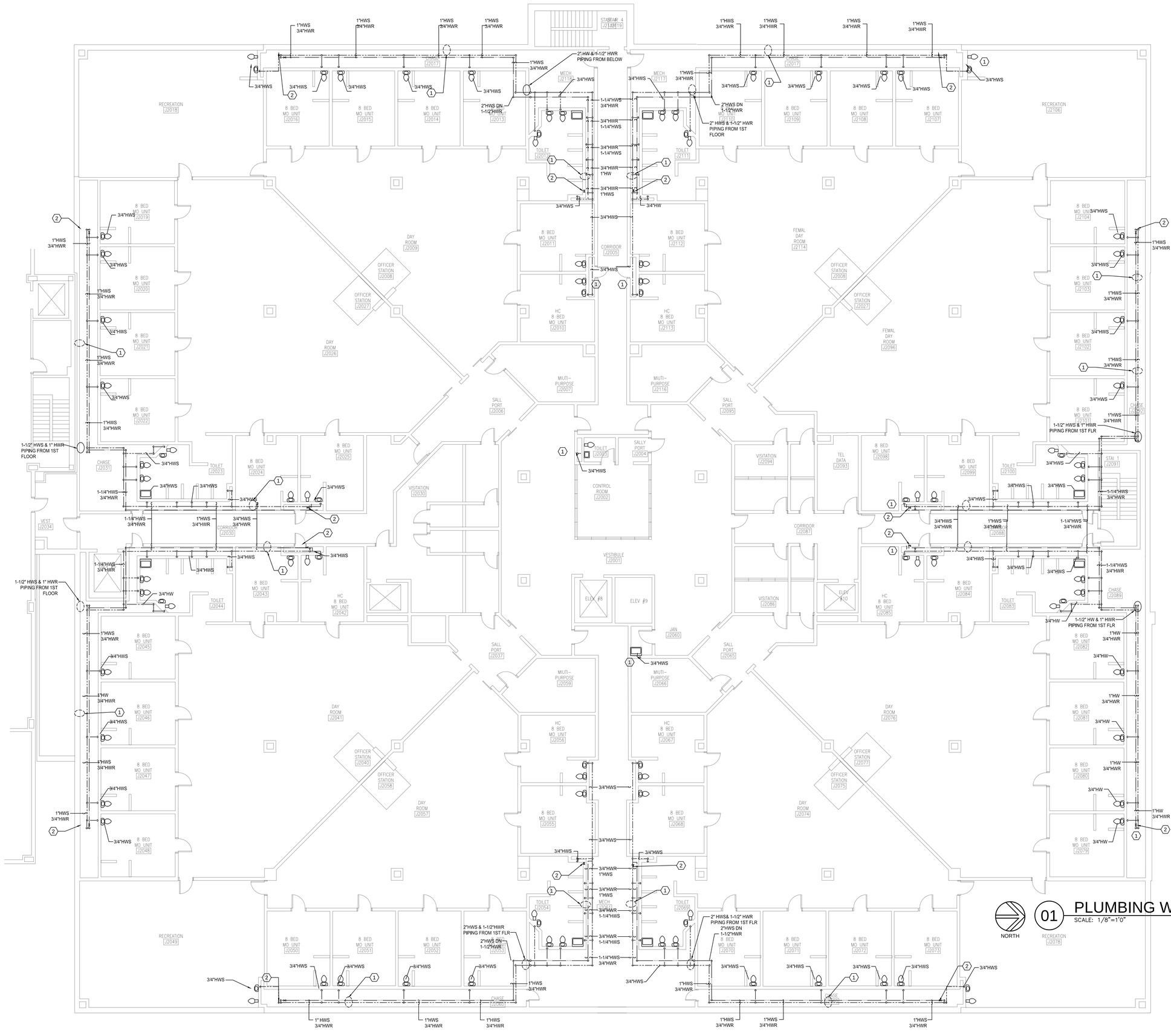
306 W. 4TH STREET
GEORGETOWN, TX 78626

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	5.22.17	CONSTRUCTION DOCS

PROJECT NO:	
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SHEET TITLE
PLUMBING WATER PLAN FIRST FLOOR

P101
SHEET



KEYED NOTES:

1. PROVIDE INTERNAL EPOXY PIPE LINER FOR ALL DOMESTIC HOT WATER SUPPLY AND RETURN PIPING SHOWN ON PLAN. CONTRACTOR SHALL FIELD VERIFY EXISTING BUILDING WATER SYSTEM PRIOR TO BID. LINER SHALL BE SIMILAR TO NU LINE EPOXY COATING MANUFACTURED BY NU-FLOW OR ENGINEER APPROVED EQUAL.

2. PROVIDE 1/2" INLINE, THERMOSTATIC STAINLESS STEEL AUTOMATIC FLOW CONTROL VALVE AT START OF EACH HOT WATER RETURN LINE. VALVE SHALL BE SELF CONTAINED AND FULLY AUTOMATIC WITHOUT ADDITIONAL PIPING OR CONTROL MECHANISMS. PROVIDE CIRCUIT SOLVER VALVES AS MANUFACTURED BY THERM-OMEGA-TECH OR ENGINEER APPROVED EQUAL. VALVE SHALL BE ADJUSTABLE FROM 105F TO 140F. (VALVE SHALL BE NSF CERTIFIED.) ALLOW FOR A TOTAL OF 50 VALVE TO BE INSTALLED. ((NOTER: PROVIDE AN INSTALLED UNIT PRICE FOR ADDITIONAL VALVES AS REQUIRED.)

NORTH

01 PLUMBING WATER PLAN SECOND FLOOR

SCALE: 1/8"=1'0"

0 4 8 16 20

GRAPHIC SCALE

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WILLIAMSON COUNTY JAIL RENOVATION

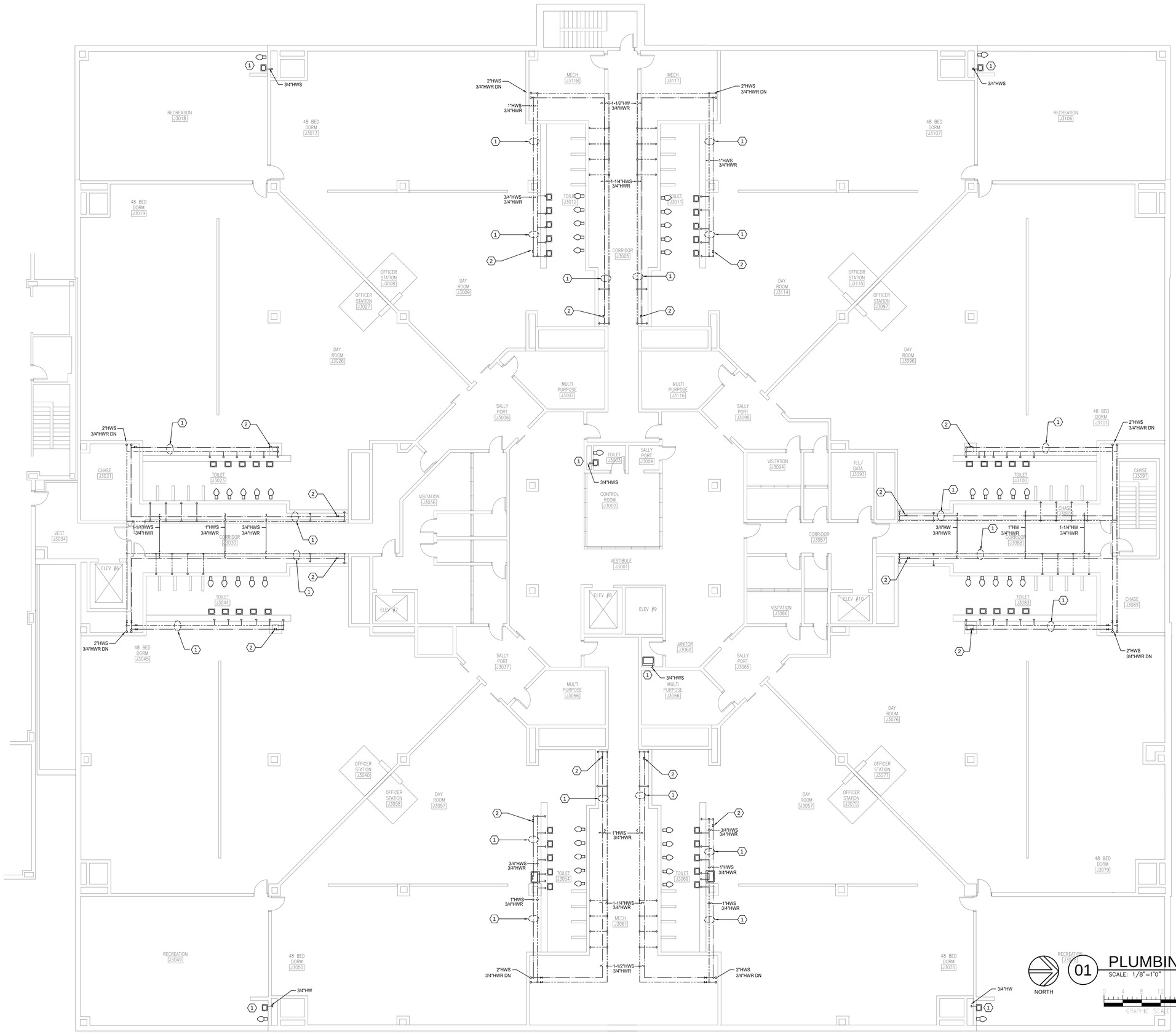
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SHEET TITLE
PLUMBING WATER PLAN SECOND FLOOR

P102
SHEET



KEYED NOTES:

1. PROVIDE INTERNAL EPOXY PIPE LINER FOR ALL DOMESTIC COLD WATER, HOT WATER SUPPLY AND RETURN PIPING SHOWN ON PLAN. CONTRACTOR SHALL FIELD VERIFY EXISTING BUILDING WATER SYSTEM PRIOR TO BID. LINER SHALL BE SIMILAR TO NU LINE EPOXY COATING MANUFACTURED BY NU-FLOW OR ENGINEER APPROVED EQUAL.
2. PROVIDE 1/2" INLINE, THERMOSTATIC STAINLESS STEEL AUTOMATIC FLOW CONTROL VALVE AT START OF EACH HOT WATER RETURN LINE. VALVE SHALL BE SELF CONTAINED AND FULLY AUTOMATIC WITHOUT ADDITIONAL PIPING OR CONTROL MECHANISMS. PROVIDE CIRCUIT SOLVER VALVES AS MANUFACTURED BY THERM-OMEGA-TECH OR ENGINEER APPROVED EQUAL. VALVE SHALL BE ADJUSTABLE FROM 105ºF TO 140F. (VALVE SHALL BE NSF CERTIFIED.) ALLOW FOR A TOTAL OF 50 VALVE TO BE INSTALLED. ((NOTER: PROVIDE AN INSTALLED UNIT PRICE FOR ADDITIONAL VALVES AS REQUIRED.)

01 PLUMBING WATER PLAN THIRD FLOOR

SCALE: 1/8"=1'0"

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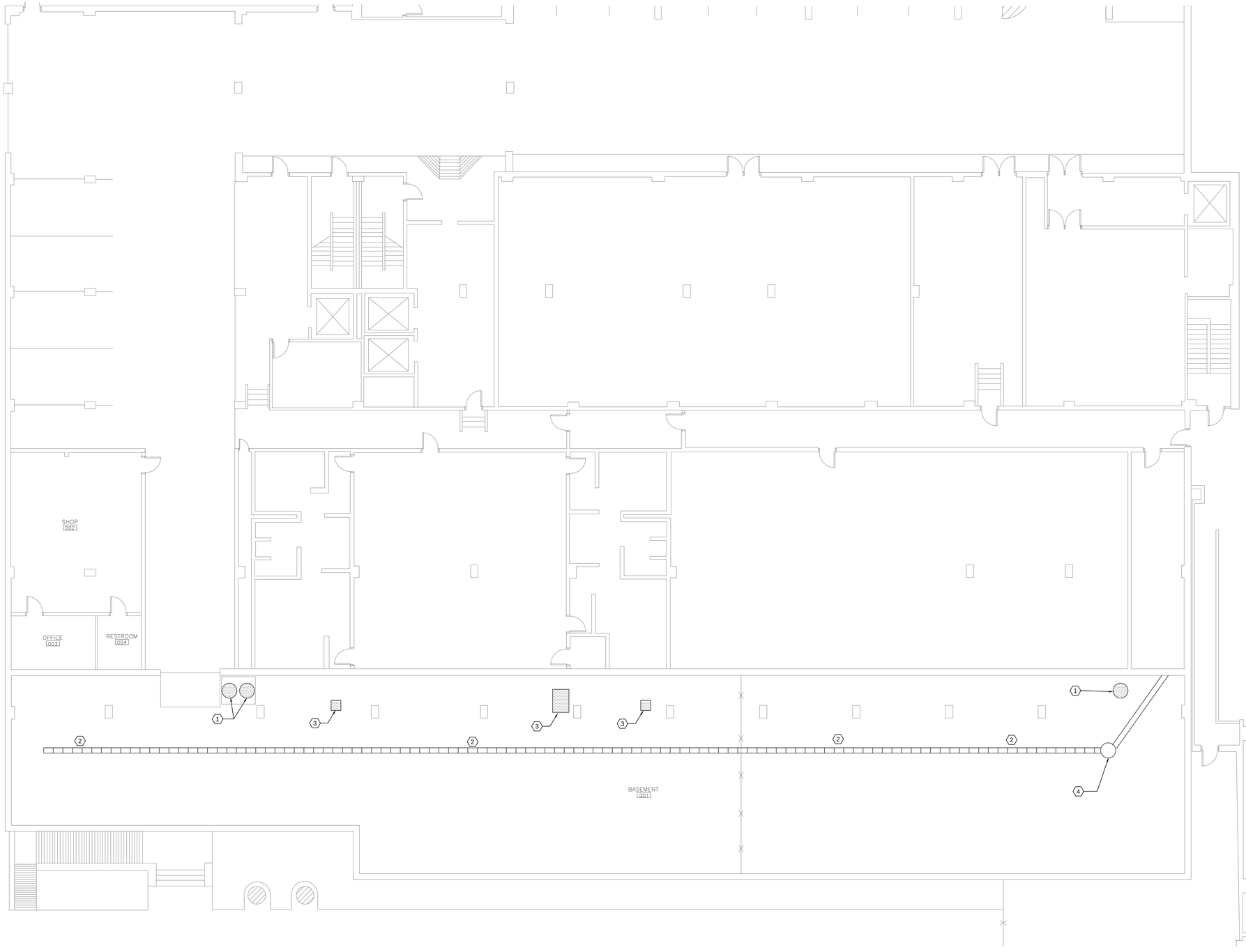
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DRAWN BY:	SR
DESIGNED BY:	OV
CHECKED BY:	TA

SHEET TITLE
PLUMBING WATER PLAN THIRD FLOOR

P103
SHEET

Bid 17105-186

Williamson County, Texas



KEYED NOTES :

1. EXISTING WATER HEATERS TO REMAIN.
2. EXISTING TRENCH DRAIN TO REMAIN.
3. EXISTING MECHANICAL EQUIPMENT TO REMAIN.
4. EXISTING STORM SEWER MANHOLE TO REMAIN. WELD SHUT TOP LID OF MANHOLE.

NORTH

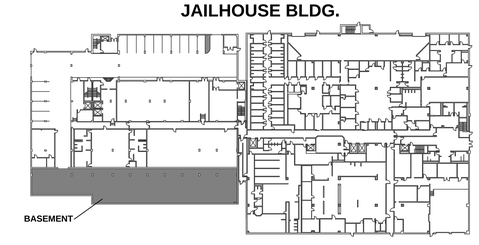
01 PLUMBING PLAN BASEMENT

SCALE: 1/4"=1'0"

0 4 8 12 16 20

GRAPHIC SCALE

KEY PLAN



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	5.22.17	CONSTRUCTION DOCS

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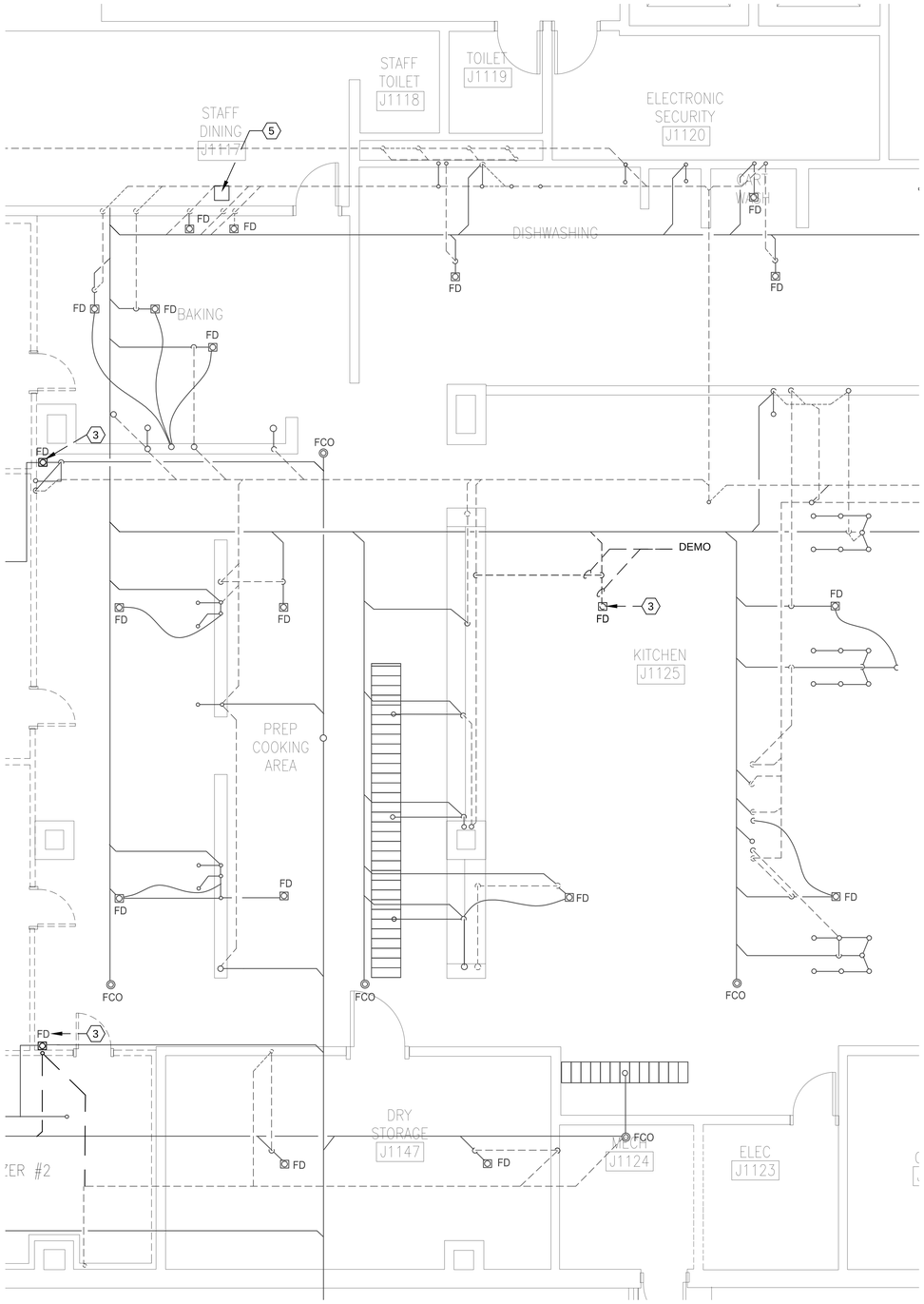
SHEET TITLE
PLUMBING
PLAN
BASEMENT

P200
SHEET

6/1/2017 8:38 AM

Bid 17105-186

Williamson County, Texas

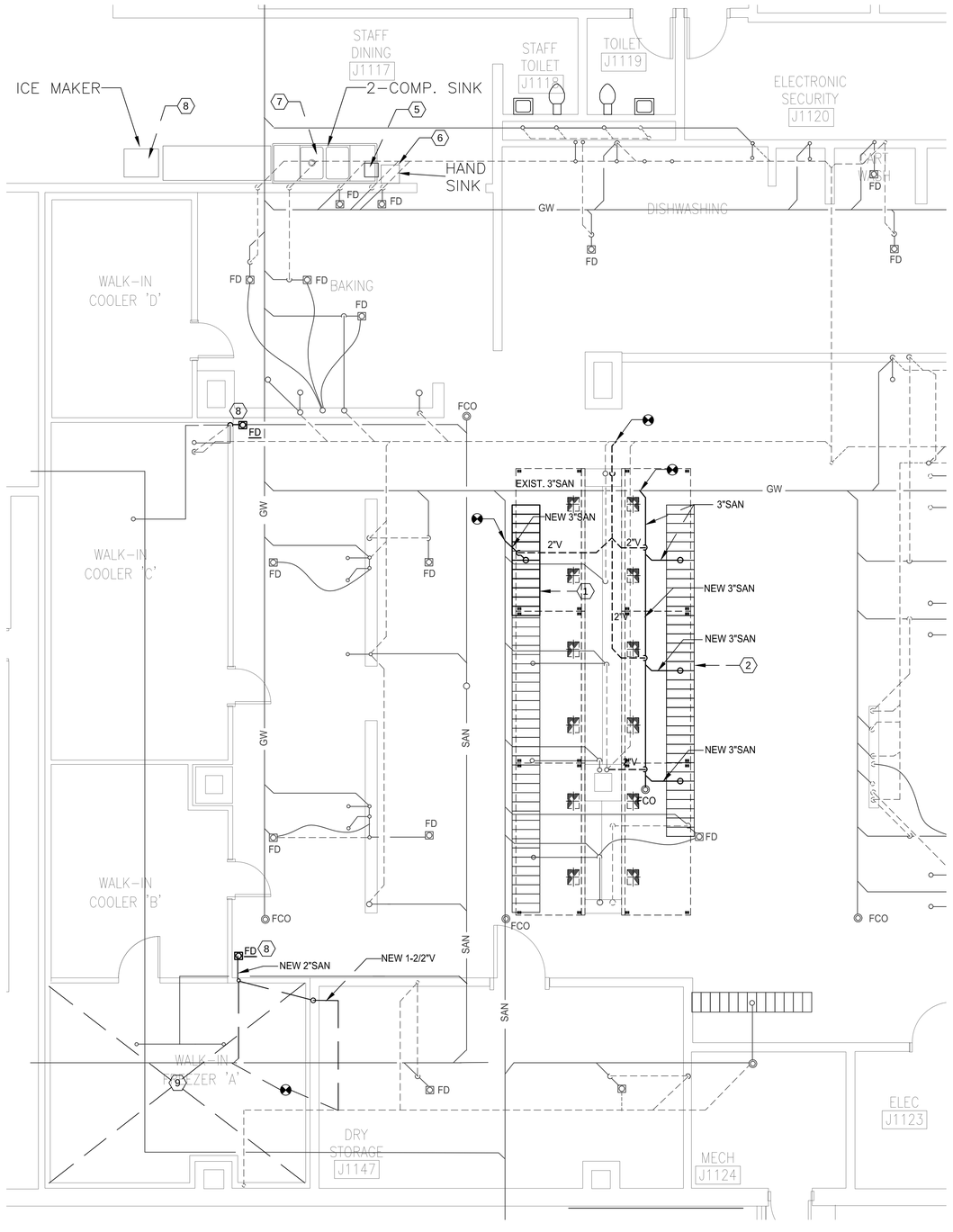


01 PLUMBING DEMO WASTE PIPING KITCHEN PLAN

SCALE: 1/4"=1'-0"

NORTH

GRAPHIC SCALE 0 2 4 6 8 10



02 PLUMBING WASTE PIPING KITCHEN PLAN

SCALE: 1/4"=1'-0"

NORTH

GRAPHIC SCALE 0 2 4 6 8 10

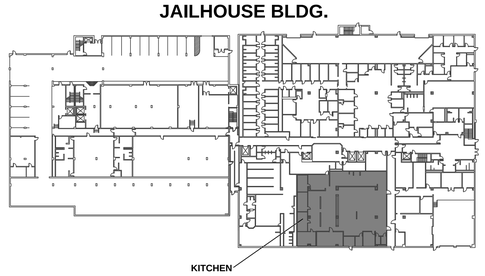
PLUMBING LEGEND

	EXISTING TO REMAIN
	NEW EQUIPMENT
	POINT OF CONNECTION NEW TO EXISTING

KEYED NOTES :

1. PROVIDE NEW, SECURITY TROUGH DRAIN EQUAL TO IMC/TEDDY MODEL SEC-ASFT 24-8, 3" DRAIN OUTLET. SAWCUT FLOOR SLAB AS NEEDED.
2. PROVIDE NEW, SECURITY TROUGH DRAIN EQUAL TO IMC/TEDDY MODEL SEC-ASFT 24-24, 3 - 3" DRAIN OUTLETS. SAWCUT FLOOR SLAB AS NEEDED.
3. DEMO EXISTING FLOOR DRAIN. SAWCUT FLOOR SLAB AS NEEDED. CAP SANITARY AND VENT PIPING.
4. INSTALL NEW 3"SANITARY LINE. SAWCUT FLOOR SLAB AS NEEDED.
5. EXISTING SANITARY FLOOR SINK TO REMAIN.
6. ROUTE 1-1/2" DRAIN LINE FROM NEW HAND WASH SINK TO EXISTING FLOOR SINK.
7. ROUTE 1-1/2" DRAIN LINE FROM NEW SINK TO EXISTING FLOOR SINK.
8. PROVIDE NEW FLOOR (FD) DRAIN WHERE SHOWN PLUMBING PLAN. SAWCUT SLAB AND EXTEND EXISTING SANITARY AND VENT PIPING AS NEEDED. NEW FLOOR DRAIN SHALL BE SIMILAR TO JR SMITH FIG. 2010, 2" CAST IRON SANITARY PIPE, 1-1/2" CAST IRON VENT PIPE, CAST IRON FLOOR DRAIN BODY AND FLASHING COLLAR ADJUSTABLE. PROVIDE WITH AN ADJUSTABLE CHROME PLATED STRAINER.
9. FREEZER FLOOR TO BE REMOVED AND REPLACED. REFERENCE STRUCTURAL PLANS.

KEY PLAN



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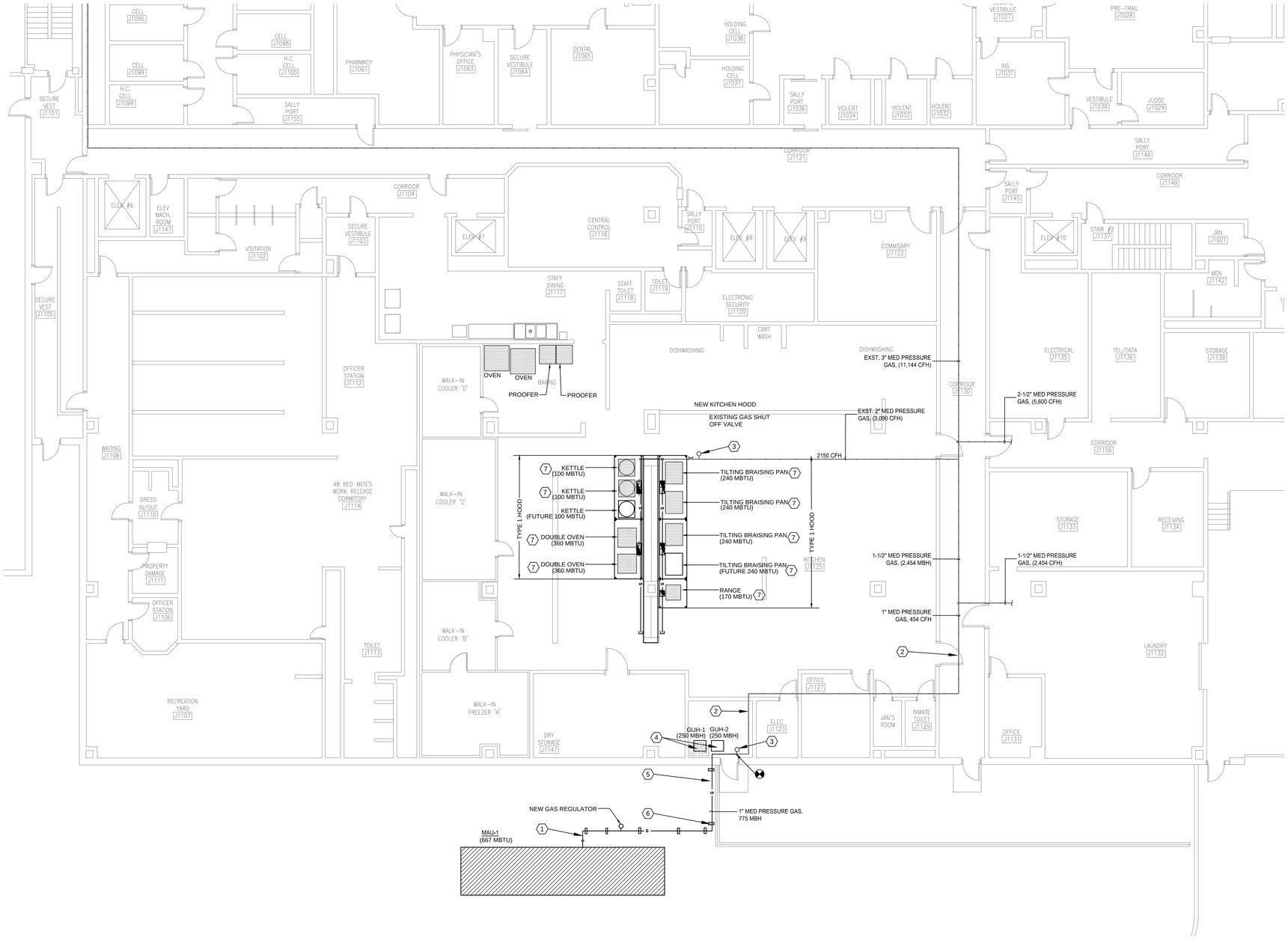
SHEET TITLE
PLUMBING WASTE PIPING KITCHEN PLANS

P201
SHEET

6/1/2017 8:38 AM

Bid 17105-166

Williamson County, Texas



KEYED NOTES:

1. MAKE CONNECTION TO GAS HEATER OF NEW MAKE-UP AIR UNIT USING UNION, SHUT-OFF VALVE, AND DRIP LEG.
2. EXISTING 1" MEDIUM PRESSURE GAS LINE TO REMAIN.
3. EXISTING MEDIUM-TO-LOW GAS, PRESSURE REGULATOR TO REMAIN
4. REMOVE GAS CONNECTIONS FROM TWO EXISTING UNIT HEATERS. REMOVE LOW PRESSURE GAS PIPING BACK TO EXISTING REGULATOR.
5. NEW 2" LOW PRESSURE GAS LINE ABOVE GROUND. WIRE BRUSH THOROUGHLY AND PAINT YELLOW.
6. GAS PIPE SUPPORT, ISOLATING CLAMP MOUNTED ON OUTDOOR RATED CHANNEL (ADJUSTABLE HEIGHT), BOLTED TO 12"x12" REINFORCED CONCRETE PAD WITH BEVELED EDGES, TYPICAL
7. MAKE CONNECTION TO EXISTING RELOCATED KITCHEN EQUIPMENT.

REMODEL LEGEND	
	EXISTING TO REMAIN
	NEW EQUIPMENT
	POINT OF CONNECTION NEW TO EXISTING

NORTH

01 PLUMBING GAS PIPING PLAN FIRST FLOOR

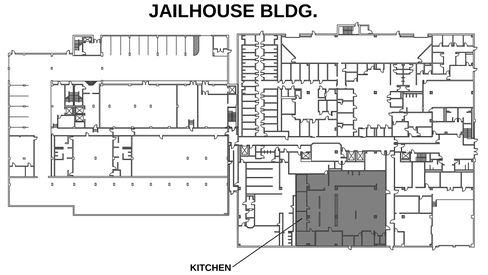
SCALE: 1/8"=1'0"

0 4 8 12 16 20

GRAPHIC SCALE

KEY PLAN

JAILHOUSE BLDG.



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PLUMBING GAS PIPING PLAN FIRST FLOOR

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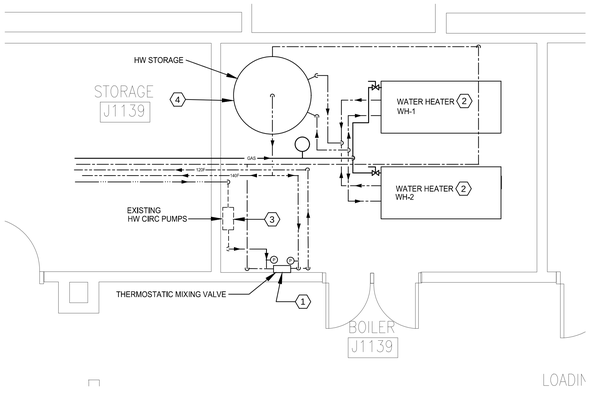
DOMESTIC HOT WATER SEQUENCE OF OPERATION

1. EXISTING WATER HEATERS SHALL SEQUENCE AND MODULATE TO MAINTAIN SETPOINT THRU THE EXISTING ON-BOARD CONTROLS.
2. NEW CIRCULATING WATER PUMPS ARE REDUNDANT AND ONLY ONE SHALL RUN AT A TIME. PROVIDE AN ALTERNATING SEQUENCER CONSISTING OF A MECHANICALLY HELD 2-POSITION CONTACTOR WITH SELECTOR SWITCH AND PILOT LIGHTS. SELECTOR SHALL SELECT P-1, P-2, OFF, AUTO. THE AUTO POSITION SHALL BE CONNECTED TO THE EXISTING BUILDING MANAGEMENT SYSTEM (BMS). PROVIDE GRAPHICS AND SELECTOR SEQUENCE TO CHANGE LEAD ON A WEEKLY BASIS (ADJUSTABLE).
3. VARIABLE ECM MOTORS ON PUMPS SHALL BE PROGRAMMED TO MAINTAIN CONSTANT TEMPERATURE RETURN (105degF ADJUSTABLE).
4. SETPOINT SHALL BE ADJUSTABLE FROM THE BMS AND INDICATED ON GRAPHICS.
5. RETURN TEMPERATURE SHALL BE MONITORED AND INDICATED ON BMS GRAPHICS.

DOMESTIC HOT WATER RECIRCULATION PUMP SCHEDULE

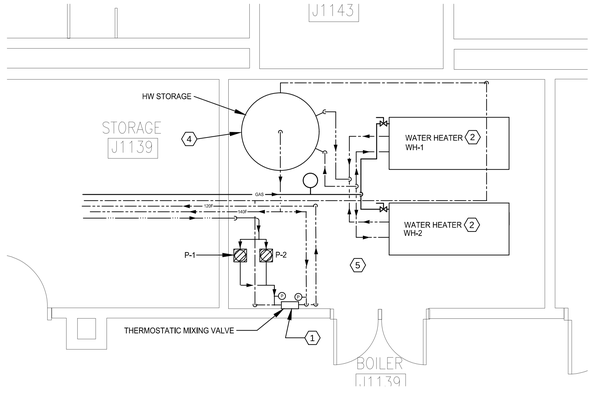
MARK	SYSTEM SERVED	TYPE	FLOW RATE (GPM)	TDH (FEET)	MOTOR HP (WATTS)	VOLT / PH	MOTOR TYPE	HOUSING. MATERIAL	MANUFACTURER / MODEL NO.	WEIGHT LBS.
P-1	DOMESTIC HEATING SYSTEM	IN-LINE	25	52	614.0	120 / 1	ECM	STAINLESS STEEL	GRUNDFOS MAGNA3 40-180FN	36
P-2	DOMESTIC HEATING SYSTEM	IN-LINE	25	52	614.0	120 / 1	ECM	STAINLESS STEEL	GRUNDFOS MAGNA3 40-180FN	36

PUMP SCHEDULES NOTES:
1. PROVIDE EACH PUMP WITH CHECK-OUT AND START-UP SERVICES FROM AN AUTHORIZED REPRESENTATIVE OF THE PUMP MANUFACTURER.
2. PUMPS SHALL BE NON-OVERLOADING THROUGHOUT THEIR CURVE.
3. PROVIDE TEMPERATURE SENSOR TO VARY PUMP SPEED TO MAINTAIN TEMPERATURE SET POINT OF HOT WATER RETURN.



01 DEMO PLAN - WH ROOM

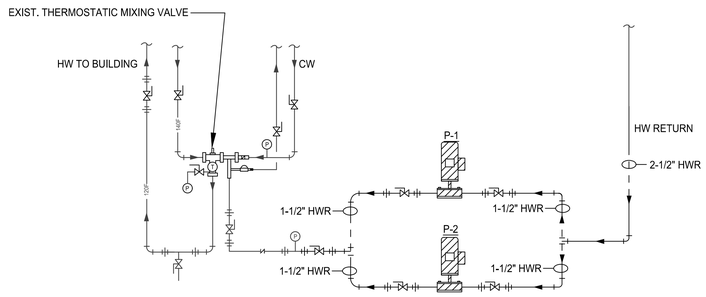
SCALE: NONE



02 PLUMBING PLAN - WH ROOM

SCALE: NONE

NOTE: TEMPORARILY REMOVE VALVES, PUMPS, AND OTHER COMPONENTS SO THAT PIPING CAN BE COMPLETELY LINED.



03 PIPING SCHEMATIC

NOT TO SCALE

NOTE: TEMPORARILY REMOVE VALVES, PUMPS, AND OTHER COMPONENTS SO THAT PIPING CAN BE COMPLETELY LINED.

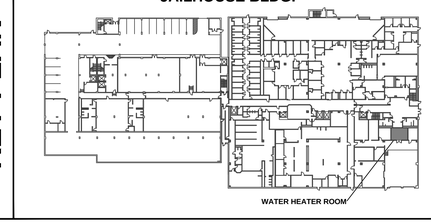
FIRE PROTECTION NOTES:

1. RELOCATE SPRINKLER HEADS TO ACCOMODATE KITCHEN CEILING REPLACEMENT AND WALL MODIFICATIONS.
2. PROVIDE ANY NEW HEADS TO ACCOMODATE MODIFICATIONS TO KITCHEN HOOD.
3. REMOVE AND RELOCATE SPRINKLER HEADS IN FREEZER AND COOLER ENCLOSURES. PROVIDE ESCUTCHEONS AND FOAM INSULATION AT SPRINKLER PIPE PENETRATIONS OF FREEZER / COOLER PANEL CEILINGS.

KEYED NOTES:

1. EXISTING THERMOSTATIC MIXING VALVE TO REMAIN.
2. EXISTING WATER HEATERS TO REMAIN.
3. DEMO EXISTING HOT WATER CIRCULATION PUMPS.
4. EXISTING HOT WATER STORAGE TANK TO REMAIN.
5. PROVIDE NEW HOT WATER CIRCULATION PUMPS PER PUMP SCHEDULE.

KEY PLAN



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PLANNERS
SURVEYORS
WACO, TEXAS

WILLIAMSON COUNTY JAIL RENOVATION

306 W. 4TH STREET
GEORGETOWN, TX 78626

MARK	DATE	DESCRIPTION
	5.22.17	CONSTRUCTION DOCS

PROJECT NO:
DRAWN BY: SR
DESIGNED BY: OV
CHECKED BY: TA

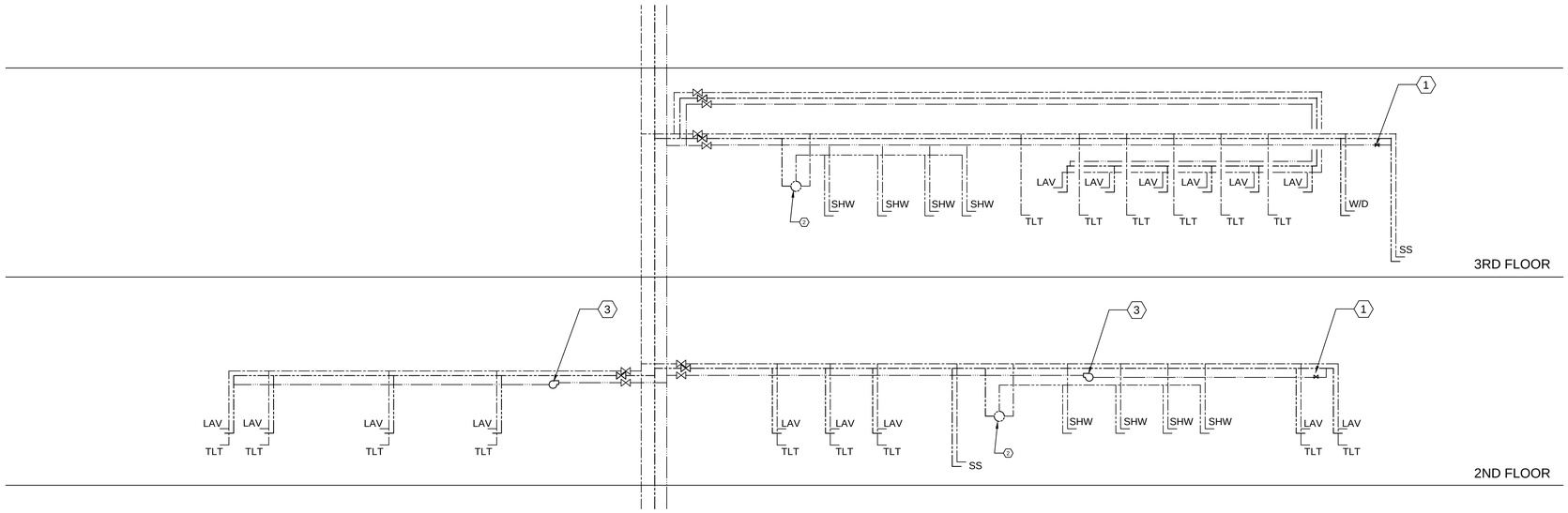
SHEET TITLE
PLUMBING PLAN AND DETAILS

P401
SHEET

6/1/2017 8:38 AM

Bid 1705-166

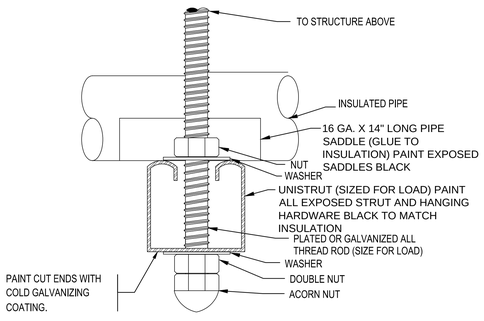
Williamson County, Texas



1 TYPICAL POD - WATER RISER
NOT TO SCALE

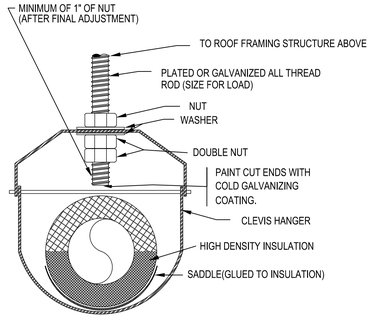
KEYED NOTES:

1. INSTALL 3/4" FULLY AUTOMATIC THERMOSTATIC CONTROL VALVE AT TEH START OF THE RETURN HOT WATER PIPING. VALVE SHALL BE SIMILAR TO CIRCUIT SOLVER AS MANUFACTURED BY THERM-OMEGA-TECH.
2. EXISTING THERMOSTATIC MIXING VALVE TO BE REMOVED AND REINSTALLED AFTER PIPE LINER IS INSTALLED.
3. EXISTING CIRCULATION PUMP TO BE REMOVED AND REINSTALLED AFTER PIPE LINER INSTALLED.



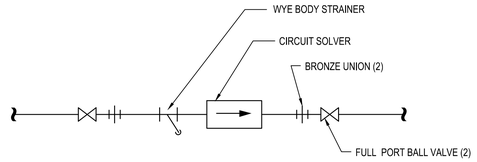
NOTE: ALL ITEMS TO BE GALVANIZED OR PLATED

A TYPICAL HANGER DETAIL
NOT TO SCALE



NOTE: 1. ALL HANGER ITEMS TO BE GALVANIZED OR PLATED
2. NON-INSULATED PIPE SUPPORT IS SIMILAR

B TYPICAL CLEVIS HANGER DETAIL
NOT TO SCALE



C THERMOSTATIC FLOW CONTROL ASSEMBLY
NOT TO SCALE

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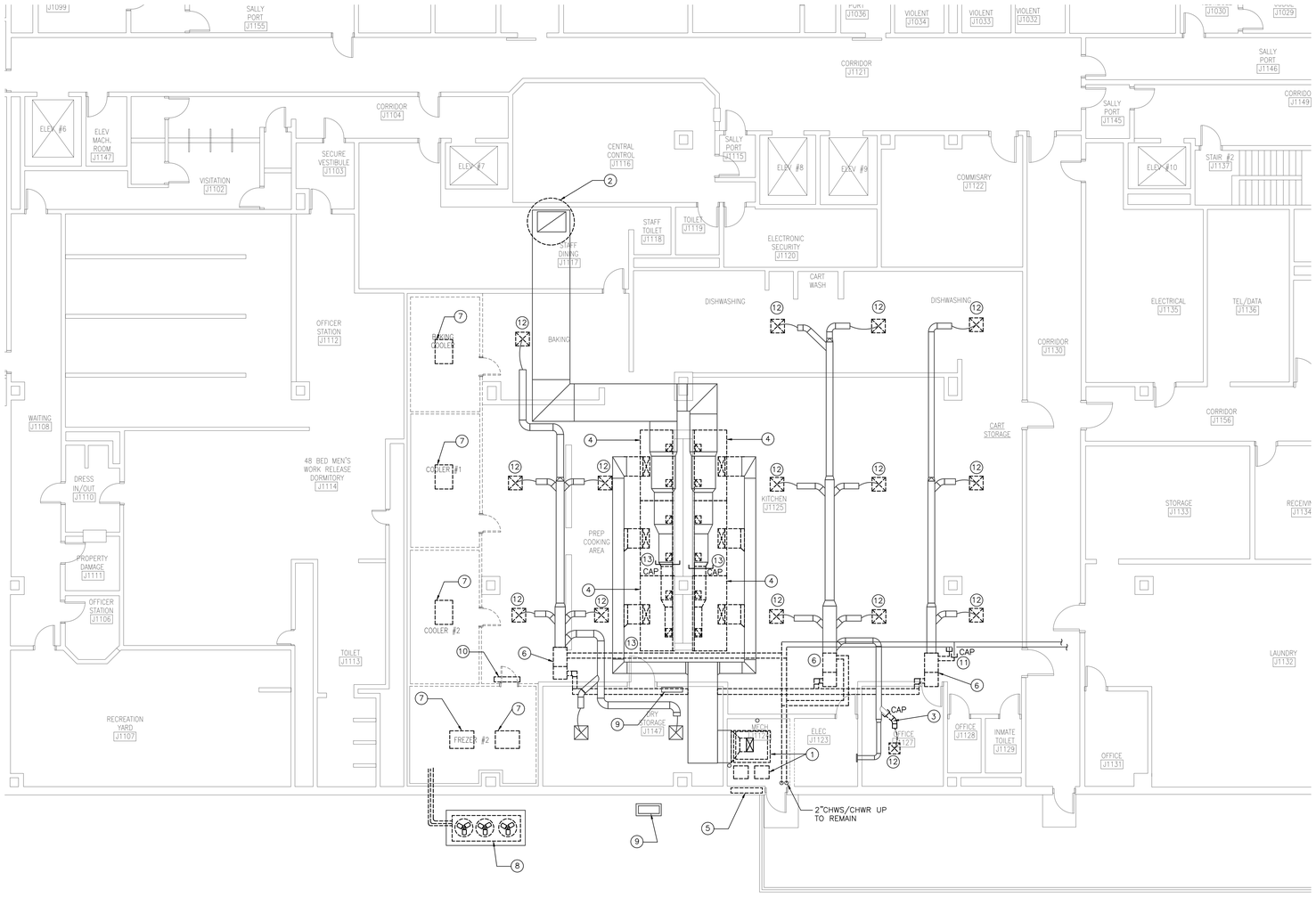
SHEET TITLE
PLUMBING RISERS / DETAILS

P402
SHEET

6/1/2017 8:38 AM

Bid 17105-166

Williamson County, Texas



MECHANICAL DEMO NOTES:

1. REMOVE EXISTING KITCHEN MAKE UP AIR SUPPLY FAN AND ASSOCIATED DUCTWORK INCLUDING GAS FIRED HEATERS.
2. REMOVE EXISTING KITCHEN HOOD EXHAUST FAN ON ROOF. EXISTING EXHAUST DUCTWORK TO BE REUSED.
3. REMOVE AIR DEVICE AND SUPPLY DUCTWORK BACK TO MAIN TRUNK LINE.
4. REMOVE EXISTING STAINLESS STEEL KITCHEN HOOD IN ITS ENTIRETY.
5. REMOVE EXISTING OUTSIDE INTAKE AIR LOUVER INCLUDING SECURITY BARS.
6. REMOVE EXISTING FAN COIL UNIT AND CAP CHILLED WATER PIPING.
7. REMOVE EXISTING INDOOR REFRIGERATION UNIT. RECOVER REFRIGERANT.
8. REMOVE EXISTING OUTDOOR REFRIGERATION UNIT AND REFRIGERANT LINES. RECOVER REFRIGERANT.
9. EXISTING INDOOR/OUTDOOR SPLIT DX UNIT SERVING DRY STORAGE ROOM TO REMAIN.
10. REMOVE EXISTING EXHAUST FAN.
11. REMOVE EXISTING CHILLED WATER SUPPLY/RETURN. CAP LINES AS SHOWN.
12. REMOVE EXISTING SUPPLY AIR DEVICES.
13. CUT AND CAP DUCTWORK WHERE SHOWN ON PLAN.

MECHANICAL DEMO LEGEND:

- DEMO EXISTING DUCTWORK / AIR DEVICE / PIPING
- EXISTING DUCTWORK / AIR DEVICE TO REMAIN
- EXISTING FAN COIL UNIT TO BE REMOVED

NORTH

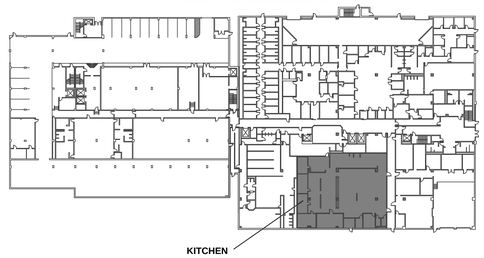
1 MECHANICAL DEMO PLAN FIRST FLOOR

SCALE: 1/8"=1'0"

0 4 8 12 16 20
GRAPHIC SCALE

KEY PLAN

JAILHOUSE BLDG.



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WILLIAMSON COUNTY JAIL RENOVATION

306 W. 4TH STREET
GEORGETOWN, TX 78626

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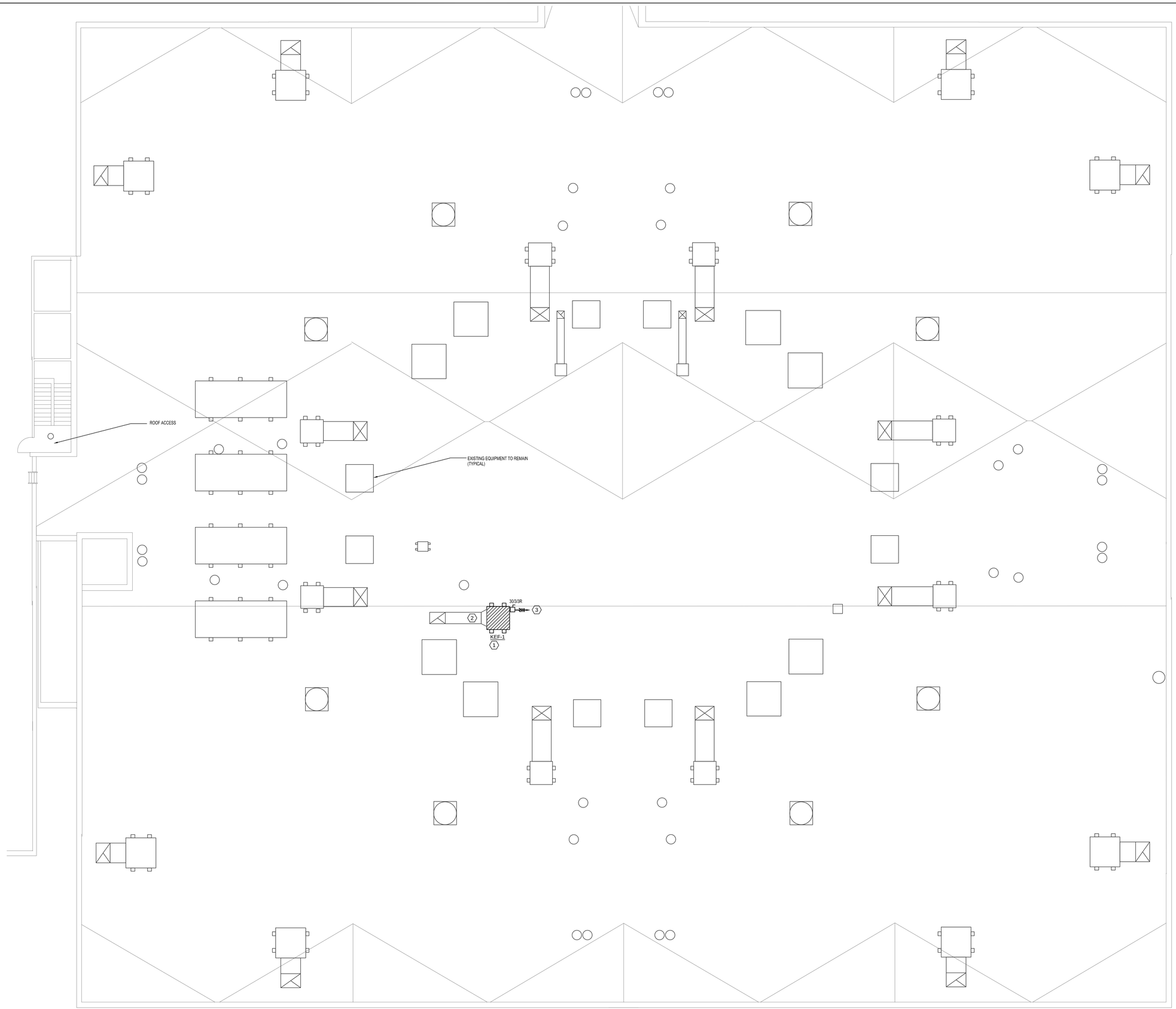
SHEET TITLE
MECHANICAL DEMO PLAN FIRST FLOOR

MD001
SHEET

6/1/2017 8:38 AM

Bid 17105-186

Williamson County, Texas



KEYED NOTES :

1. DEMO EXISTING ROOFTOP KITCHEN EXHAUST FAN AND REPLACE WITH NEW. REFER TO MECHANICAL SCHEDULES.
2. CONNECT NEW EXHAUST FAN TO EXISTING DUCTWORK.
3. CONNECT TO PROVIDED 480V/3P/30A CIRCUIT BREAKER IN EXISTING PANEL EMC4B ON 4TH FLOOR.

0 4 8 12 16 20
GRAPHIC SCALE

NORTH

01 MECHANICAL/ELECTRIC ROOF PLAN
SCALE: 1/8"=1'0"

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WILLIAMSON COUNTY JAIL RENOVATION

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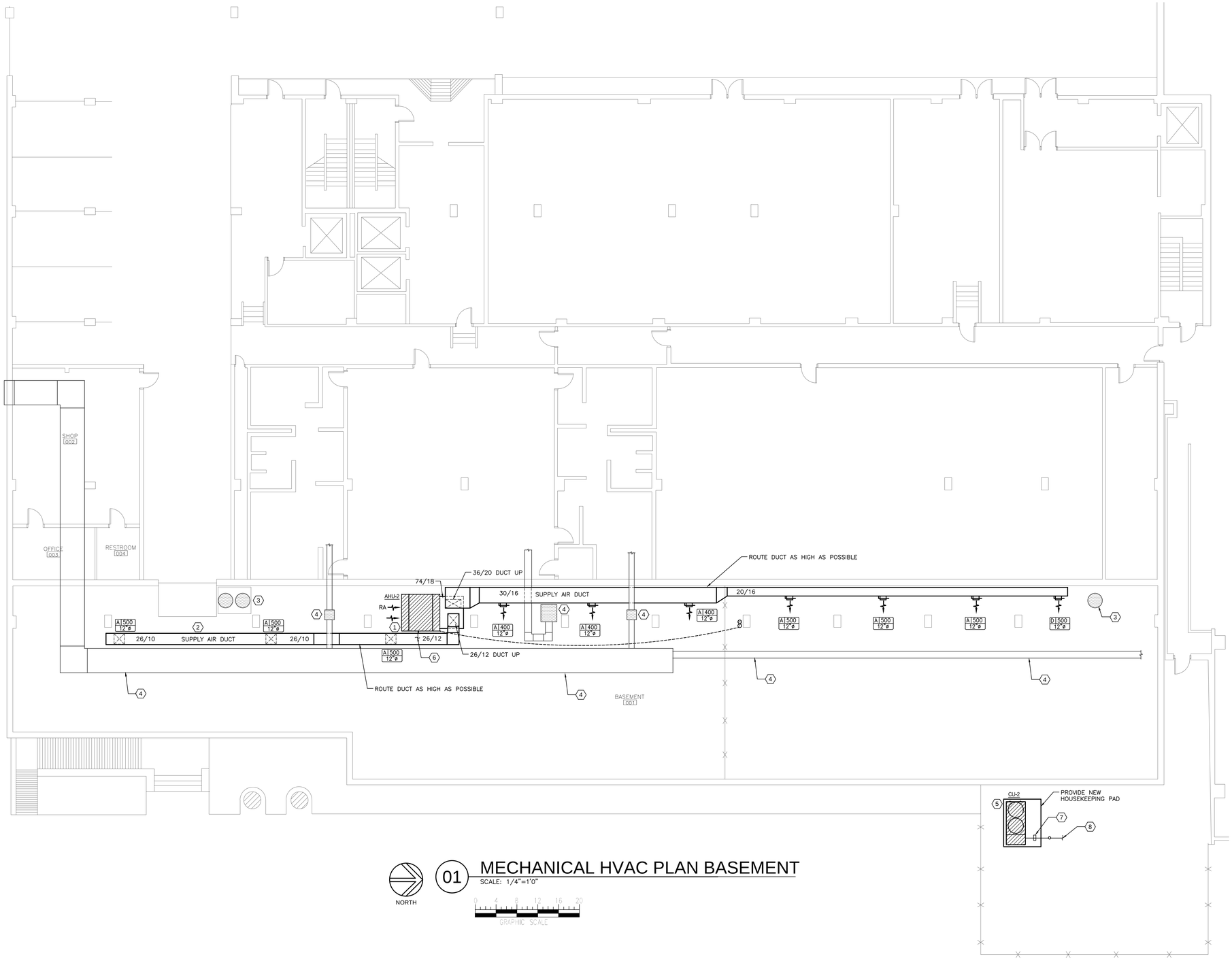
SHEET TITLE
MECHANICAL
ELECTRICAL
ROOF PLAN

ME101
SHEET

6/1/2017 8:38 AM

Bid 17/05-166

Williamson County, Texas



KEYED NOTES :

1. PROVIDE NEW SPLIT DX AIR CONDITIOING UNIT. REFER TO MECHANICAL SCHEDULE ON SHEET M601.
2. ROUTE NEW SUPPLY DUCTWORK AS SHOWN. SUPPORT FROM STRUCTURE ABOVE.
3. EXISTING WATER HEATERS TO REMAIN.
4. EXISTING MECHANICAL EQUIPMENT AND DUCTWORK TO REMAIN.
5. OUTDOOR CONDENSING UNIT. VERIFY EXACT LOCATION IN FIELD WITH OWNER PRIOR TO INSTALLATION. (NOTE: EXISTING LAWN SPRINKLER SYSTEM PIPING SHALL BE LOCATED AND PROTECTED DURING CONSTRUCTION. ANY DAMAGED SPRINKLER PIPING WILL BE REPLACED AT CONTRACTOR'S EXPENSE.)
6. ROUTE CONDENSATE DRAIN LINE TO EXISTING TRENCH DRAIN.
7. PROVIDE GALV. KINDORF CHANNEL SLEEPERS FOR SUPPORT OF REFRIGERANT PIPING.
8. ROUTE REFRIGERANT PIPING TO INDOOR UNIT.

MECH LEGEND

	EXISTING TO REMAIN
	NEW DUCTWORK
	POINT OF CONNECTION NEW TO EXISTING
	EXISTING EQUIP. TO REMAIN

01 MECHANICAL HVAC PLAN BASEMENT

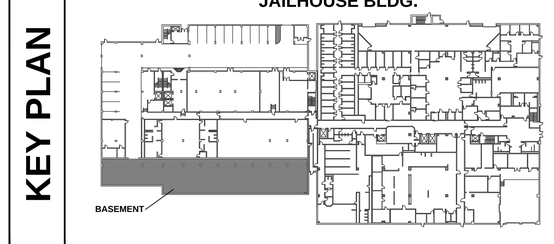
SCALE: 1/4"=1'0"

NORTH

0 4 8 12 16 20

GRAPHIC SCALE

KEY PLAN



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WACO, TEXAS

WILLIAMSON COUNTY JAIL RENOVATION

306 W. 4TH STREET
GEORGETOWN, TX 78626

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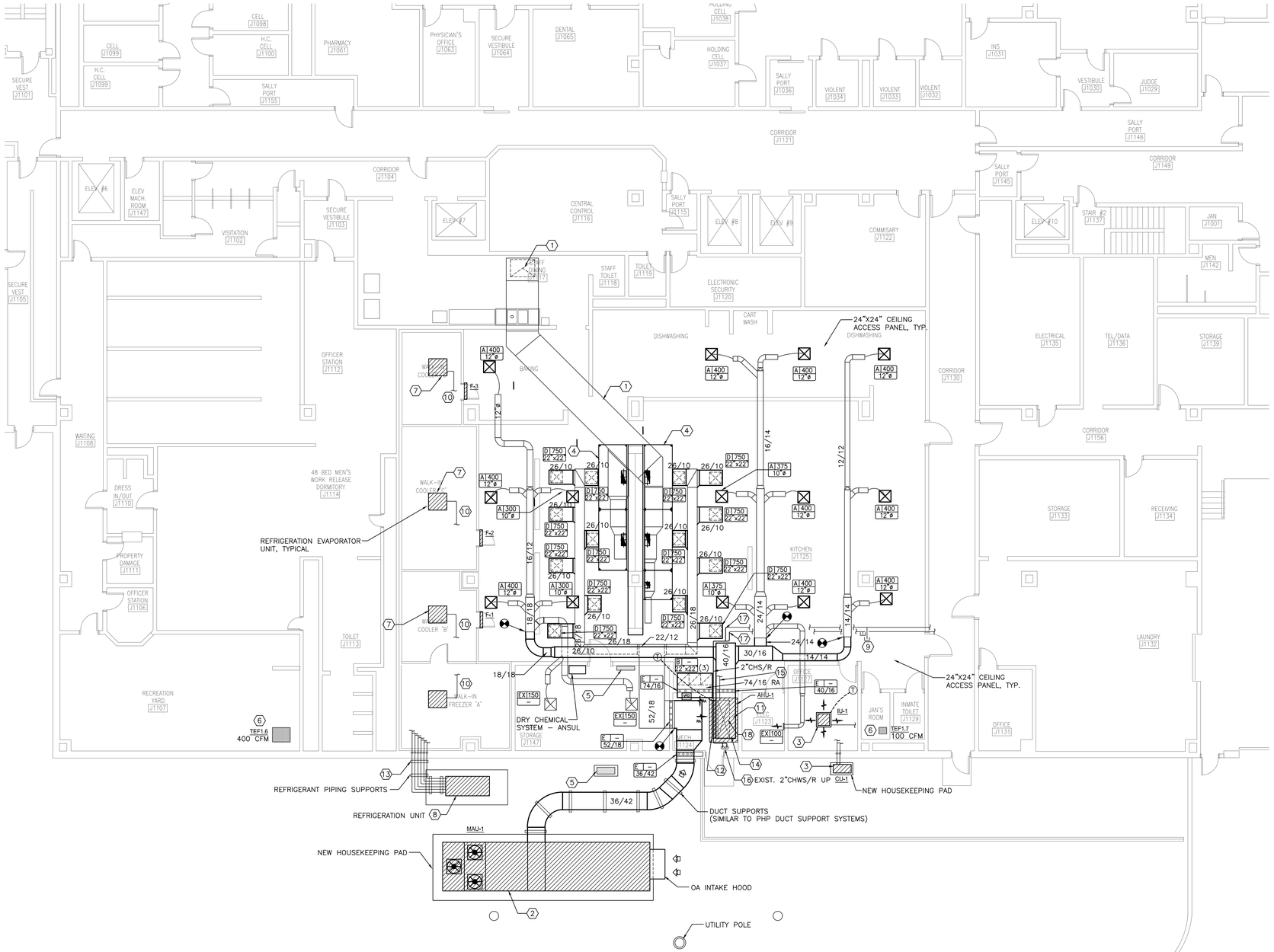
CHECKED BY: TA

SHEET TITLE
MECHANICAL HVAC PLAN BASEMENT

M100
SHEET

6/1/2017 8:38 AM

Bid 17105-186
Williamson County, Texas



KEYED NOTES:

1. REUSE EXISTING EXHAUST DUCT AND CONNECT TO NEW ROOFTOP KITCHEN EXHAUST FAN. PROVIDE NEW KITCHEN ROOFTOP EXHAUST FAN. REFER TO MECHANICAL SCHEDULES ON SHEET M–601 AND ME–101 MECHANICAL ROOF PLAN.
2. PROVIDE OUTSIDE AIR KITCHEN MAKE AIR SUPPLY FAN. REFER TO MECHANICAL SCHEDULE ON SHEET M–601 AND SEQUENCE OF OPERATION. CONTROL CABLE SHALL BE IN RMC OR IMC CONDUIT WITH LMFC (WEATHER–TITE) FLEX FROM SUPPORT RACK TO CONDUIT.
3. PROVIDE CEILING MOUNTED MINI SPLIT DX SYSTEM INDOOR UNIT. CONNECT TO OUTDOOR CONDENSING UNIT.
4. PROVIDE NEW STAINLESS STEEL KITCHEN HOOD PER SCHEDULE. REFER TO SHEET M–601 MECHANICAL SCHEDULES.
5. EXISTING INDOOR/OUTDOOR DX SPLIT SYSTEM TO REMAIN.
6. PROVIDE AIR BALANCE FOR EXISTING EXHAUST FAN TO CFM SHOWN.
7. PROVIDE NEW INDOOR REFRIGERATION EVAPORATOR UNIT. REFER TO REFRIGERATION SYSTEM SCHEDULE ON SHEET FS1.05. LOCATION AS INDICATED ON FOOD SERVICE DRAWINGS.
8. PROVIDE NEW OUTDOOR REFRIGERATION CONDENSING UNIT. REFER TO REFRIGERATION EQUIPMENT SCHEDULE.
9. PROVIDE SECURITY BARS IN SUPPLY AND RETURN DUCTWORK ENTERING THE MECHANICAL ROOM.
10. ROUTE NEW, INSULATED CONDENSATE DRAIN LINE TO FLOOR DRAIN. PROVIDE NEW DRAIN LINE INSULATION SIMILAR TO 1/2" OF ARMAFLEX INSULATION.
11. PROVIDE NEW KITCHEN (MODULAR) AIR HANDLING UNIT. INSTALL IN MECHANICAL ROOM. CONNECT NEW TO EXISTING JAIL BUILDING AUTOMATION SYSTEM (BAS). THE EXISTING SYSTEM IS AN AUTOMATED LOGIC CONTROL SYSTEM. PROVIDE ALL NECESSARY HARDWARE AND SOFTWARE TO ADD UNIT TO THE SYSTEM. MOUNT VFD ON WALL.
12. CONNECT NEW 1–1/2" CHS/R PIPING TO EXISTING CHILLED WATER LINES. NEW CHS/R LINES SERVE AIR HANDLING UNIT (AHU–1). PROVIDE SHUT–OFF VAVLES IN THE VERTICAL.
13. PROVIDE GALVANIZED KINDORF CHANNEL SLEEPERS ON 2'–0" CENTERS FOR SUPPORT OF REFRIGERANT LINES, CONTROL CONDUIT AND POWER CONDUITS. COORDINATE LOCATION OF EXTERIOR WALL PENETRATION FOR REFRIGERANT PIPING. PATCH WALL WHERE OLD REFRIGERANT PIPING WAS REMOVED.
14. PROVIDE NEW, 2" THICK HOUSEKEEPING PAD FOR AIR HANDLING UNIT (AHU–1).
15. PROVIDE CONDENSATE REMOVAL PUMP SIMILAR TO LITTLE GIANT MODEL NO. VCMA–15ULS, 1 GPM, 15' HEAD, 120V/1. ROUTE CONDENSATE PIPING TO FLOOR DRAIN IN KITCHEN.
16. PROVIDE NEW 2" CHILLED WATER SUPPLY AND RETURN PIPING AT 2" PIPE RISERS. ROUTE PIPING AS SHOWN ON PLAN.
17. CONNECT NEW 2" CHS/R TO EXISTING PIPING AT THIS LOCATION. FIELD VERIFY EXACT LOCATION.
18. 72/24 SUPPLY DUCT UP.

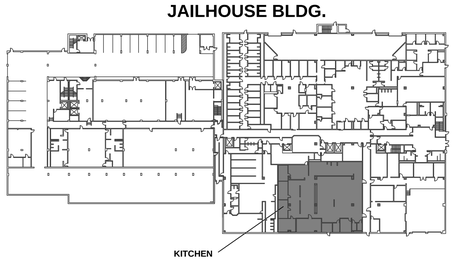
REMODEL LEGEND

	EXISTING TO REMAIN
	NEW EQUIPMENT
	POINT OF CONNECTION NEW TO EXISTING
	EXISTING EQUIPMENT TO REMAIN
	NEW EQUIPMENT

1 MECHANICAL HVAC PLAN FIRST FLOOR

SCALE: 1/8"=1'0"

KEY PLAN



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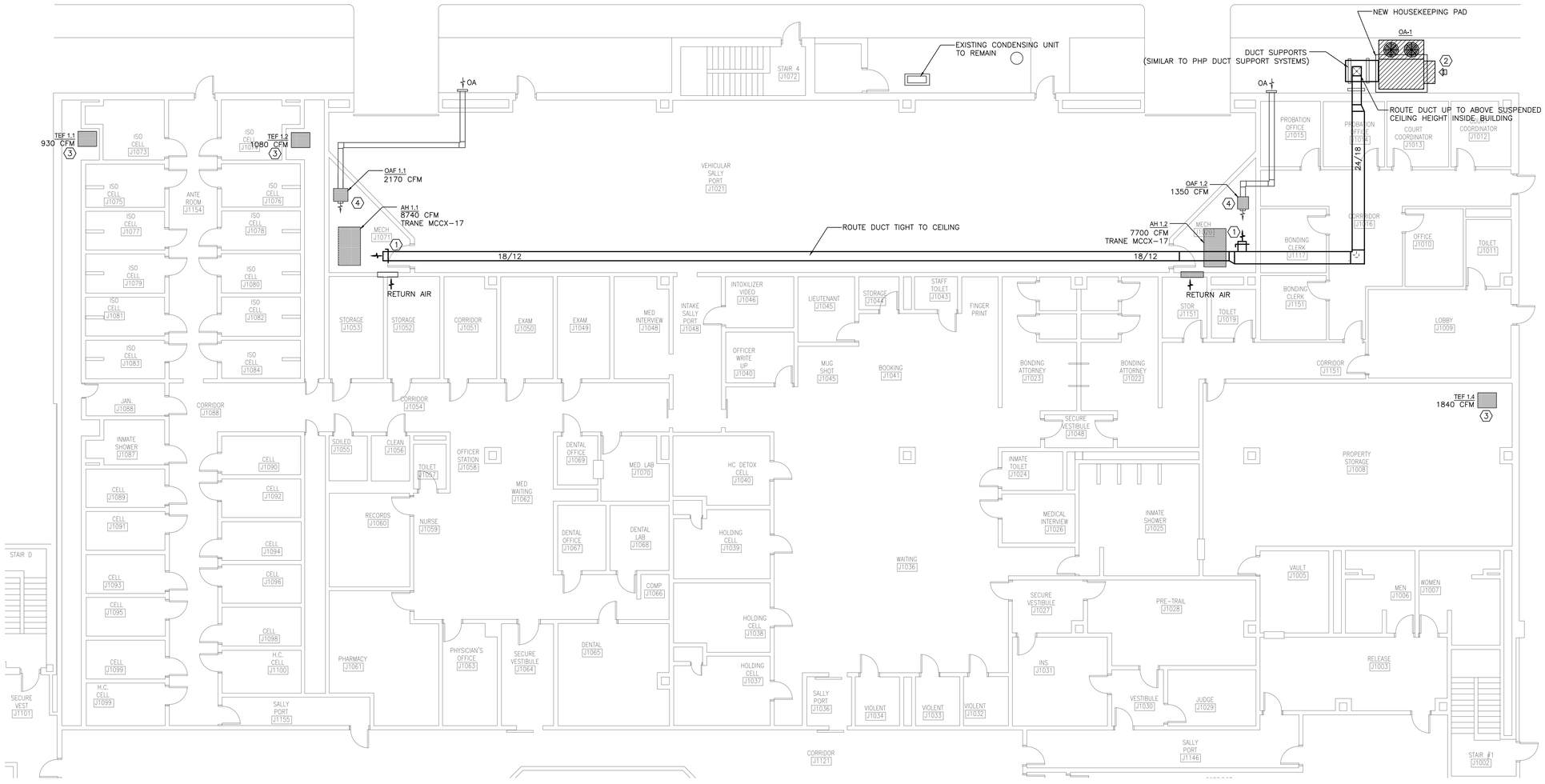
SHEET TITLE
MECHANICAL HVAC PLAN FIRST FLOOR

M101
SHEET

6/1/2017 8:58 AM
p. 325

Bid 17105-186

Williamson County, Texas



KEYED NOTES:

1. SET OUTSIDE AIR DAMPER AT 1250 CFM.
2. NEW OUTSIDE AIR MAKE UP UNIT. REFER TO MECHANICAL SCHEDULES.
3. REBALANCE EXISTING EXHAUST FAN TO AIR FLOW QUANTITY (CFM) SHOWN.
4. REBALANCE EXISTING OUTSIDE AIR FAN TO AIR FLOW QUANTITY (CFM) SHOWN.

Williamson County Jail					
FLOOR 1 NEW EQUIPMENT					
TAG		SUPPLY	OA	EXHAUST	
AH-1.1	FIRST FLOOR AHU	8,740			
AH-1.2	FIRST FLOOR AHU	7,700			
OAF1.1	OSA FAN FOR AH-1.1		2,170		
OAF1.2	OSA FAN FOR AH-1.2		1,350		
	DEDICATED OA UNIT		2,500		
TEF-1.1	TOILET EXHAUST			930	
TEF-1.2	TOILET EXHAUST			1,080	
TEF-1.4	TOILET EXHAUST			1,840	
TEF-1.6	TOILET EXHAUST			400	
TEF-1.7	TOILET EXHAUST			100	
MKF-1	KITCHEN MUA		12,500		
KEF-1	KITCHEN EXH			11,916	
BEF1.1	BAKERY EXHAUST			1,240	
	DISHWASHER EXHAUST			600	13,756
	NEW KITCHEN AHU	5,500			
		21,940	18,520	18,106	
			414		
		%	0.019	2%	

MECH LEGEND

	EXISTING TO REMAIN
	NEW DUCTWORK
	POINT OF CONNECTION NEW TO EXISTING
	EXISTING EQUIP. TO REMAIN

NORTH

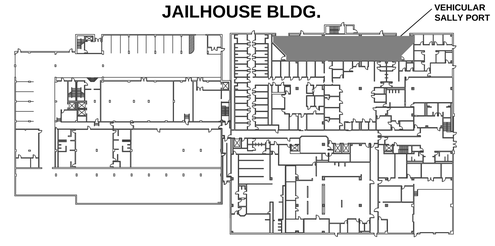
01 MECHANICAL HVAC PLAN FIRST FLOOR

SCALE: 1/8"=1'0"

0 4 8 12 16 20

GRAPHIC SCALE

KEY PLAN



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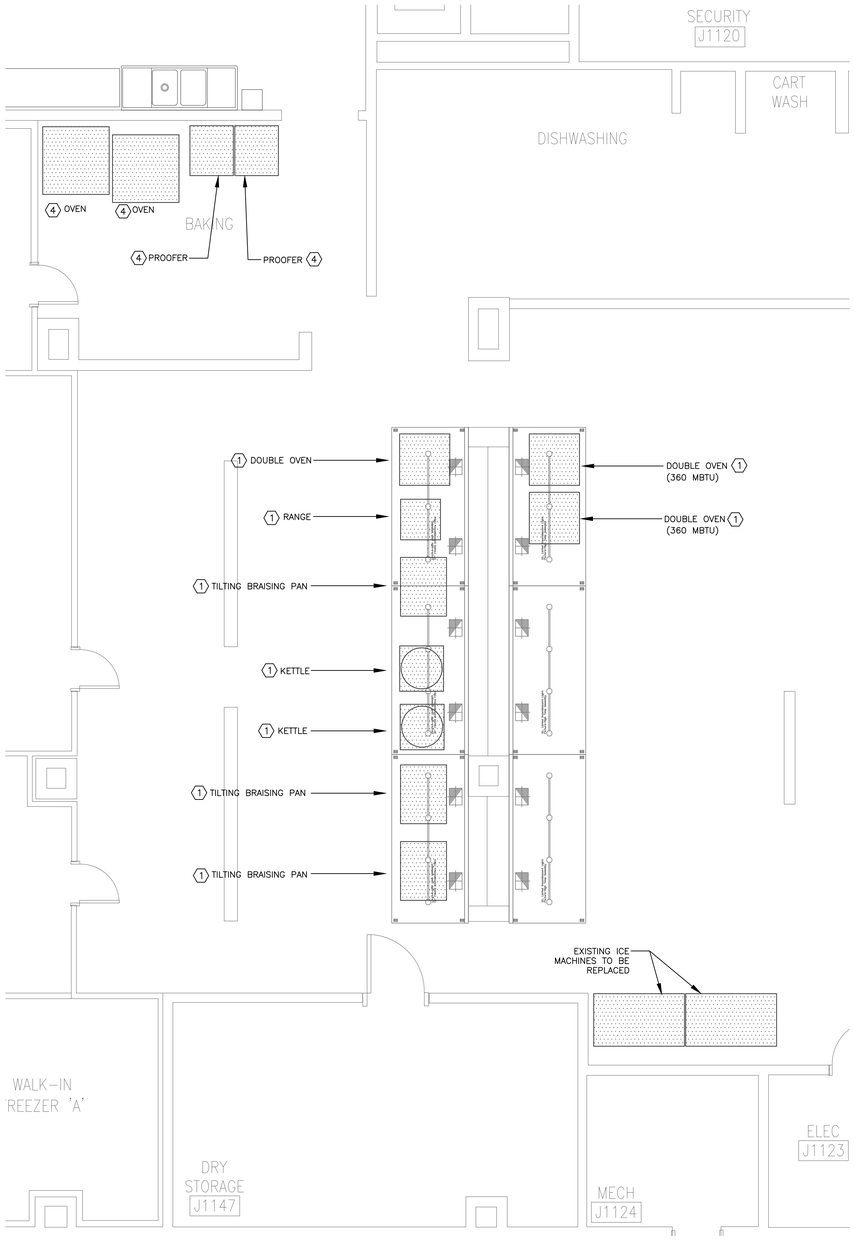
CHECKED BY: TA

SHEET TITLE
MECHANICAL HVAC PLAN FIRST FLOOR

M102
SHEET

6/1/2017 8:38 AM

Bid 17105-166
Williamson County, Texas

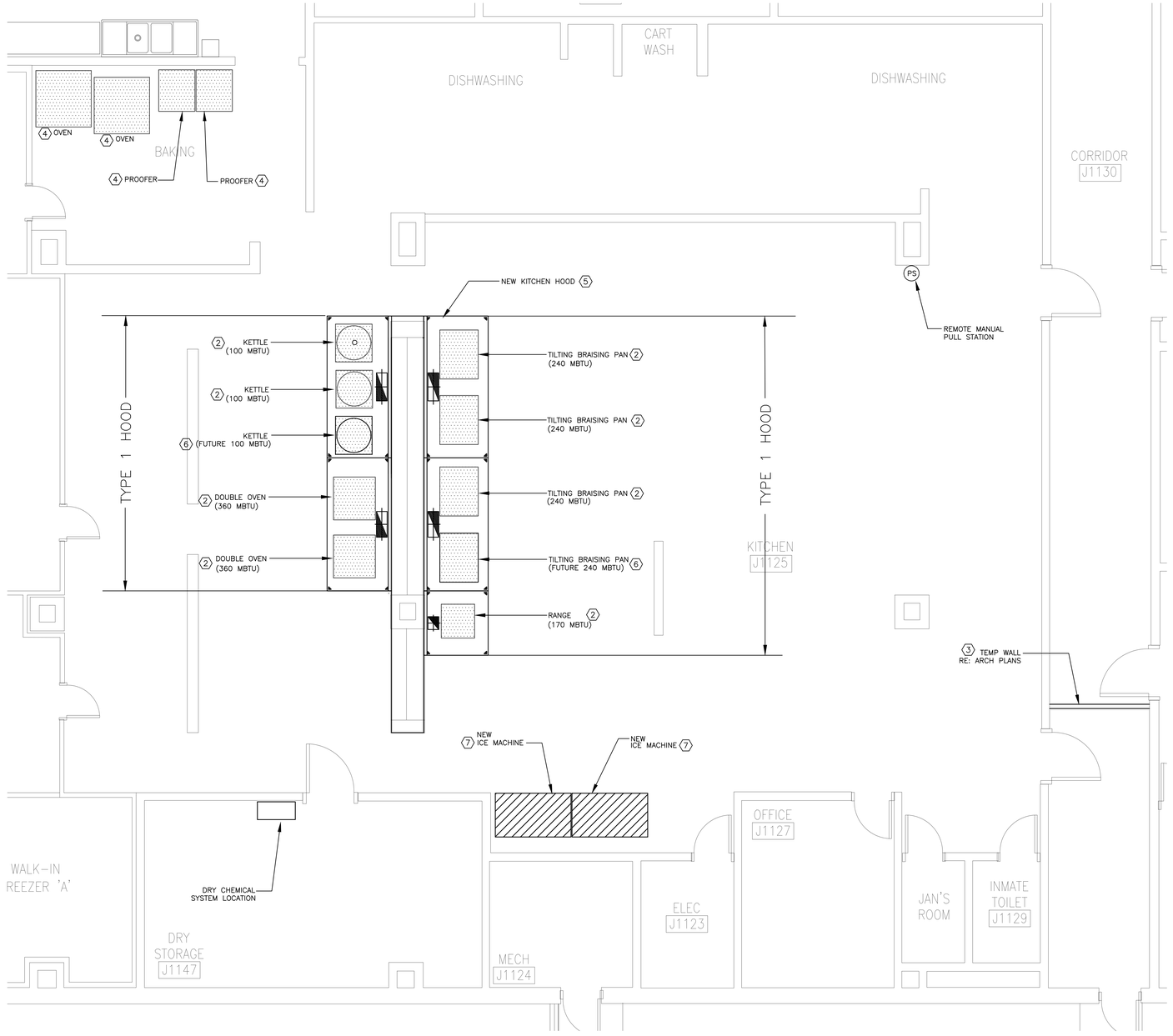


01 EXISTING KITCHEN EQUIPMENT PLAN

SCALE: 1/4"=1'0"

PLAN NORTH

0 4 8 12 16 20
GRAPHIC SCALE



02 NEW KITCHEN EQUIPMENT PLAN

SCALE: 1/4"=1'0"

PLAN NORTH

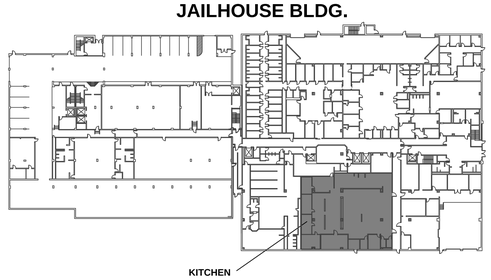
0 4 8 12 16 20
GRAPHIC SCALE

REMODEL LEGEND	
	EXISTING TO REMAIN
	NEW EQUIPMENT
	POINT OF CONNECTION NEW TO EXISTING
	EXISTING EQUIMENT TO REMAIN

KEYED NOTES:

1. EXISTING KITCHEN EQUIPMENT TO BE RELOCATED. REFER TO PLAN 02 FOR NEW LOCATION OF EQUIPMENT.
2. RELOCATE AND CONNECT EXISTING KITCHEN EQUIPMENT WHERE SHOWN ON PLAN, TYP.
3. REFER TO ARCH PLAN FOR TEMPORARY WALL.
4. EXISTING BAKING OVENS AND PROOFERS TO BE MOVED AND RECONNECTED AT COMPLETION OF FLOOR WORK IN BAKERY.
5. PROVIDE NEW KITCHEN HOOD. REFER TO KITCHEN HOOD PLANS ON SHEET M301 AND KITCHEN HOOD SCHEDULE ON SHEET M602.
6. FUTURE KITCHEN EQUIPMENT.
7. EXISTING ICE MACHINE TO BE REPLACED. REFER TO KITCHEN REFRIGERATION EQUIPMENT SCHEDULE.

KEY PLAN



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WACO, TEXAS

WILLIAMSON COUNTY JAIL RENOVATION

306 W. 4TH STREET
GEORGETOWN, TX 78626

MARK	DATE	DESCRIPTION
	5.22.17	CONSTRUCTION DOCS

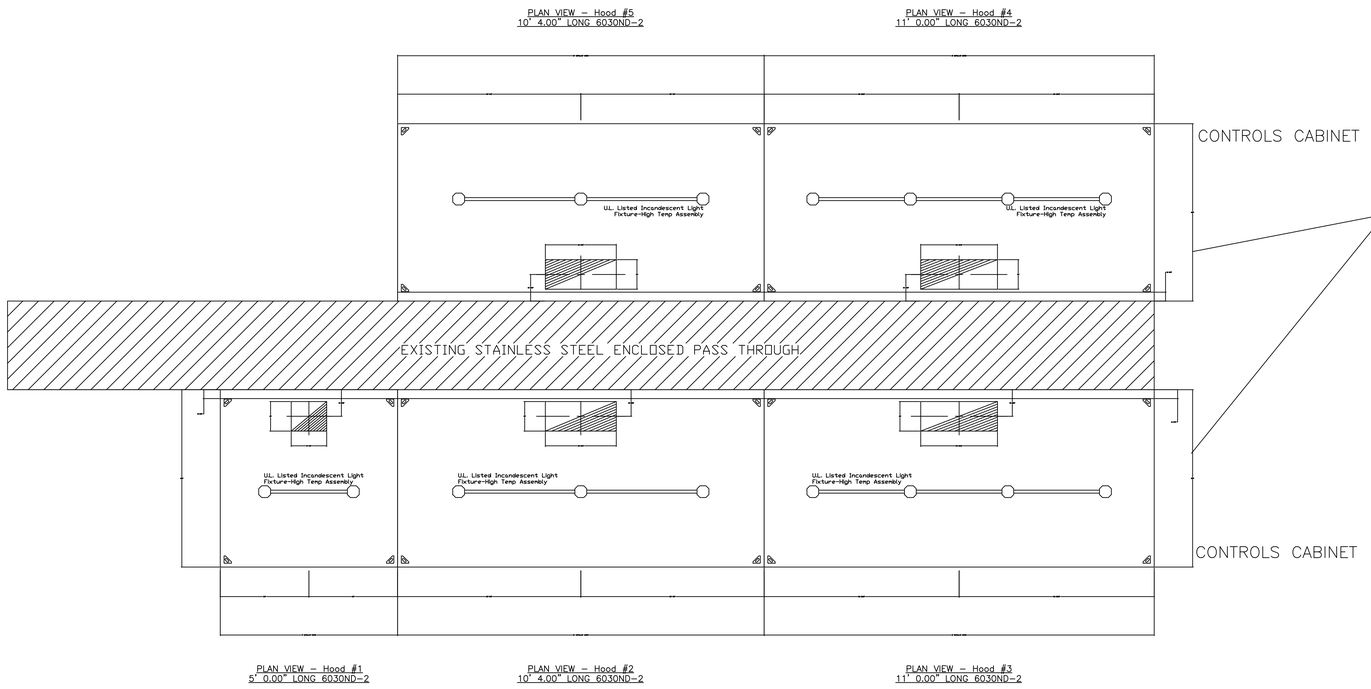
PROJECT NO:
DRAWN BY: SR
DESIGNED BY: OV
CHECKED BY: TA

SHEET TITLE
KITCHEN EQUIPMENT PLANS

M201
SHEET

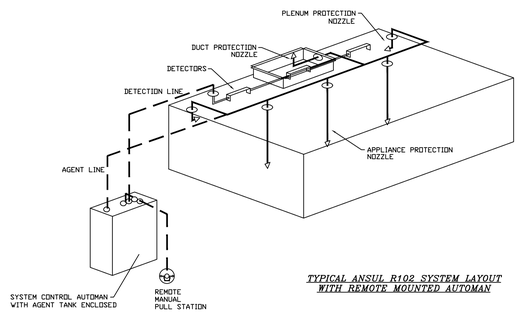
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p. 327

Bid 17/05-166
Williamson County, Texas



PROVIDE SECURITY LOCKS ON ALL ACCESS DOORS

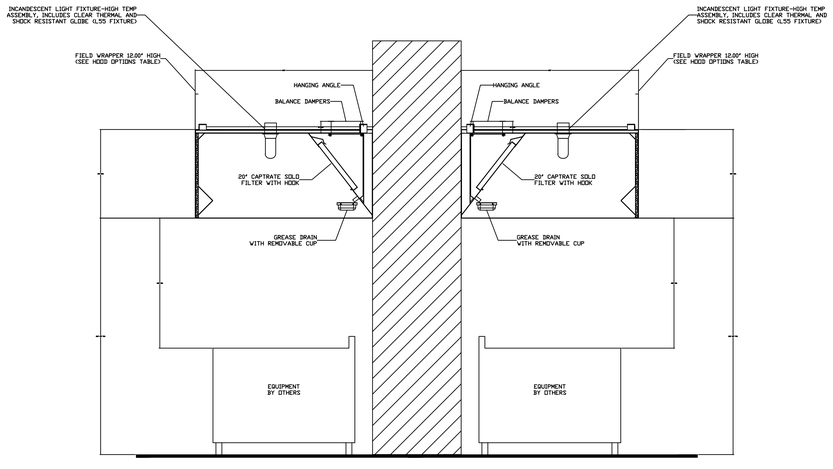
REFER TO SHEET M602 FOR KITCHEN HOOD SCHEDULES



TYPICAL ANSUL R102 SYSTEM LAYOUT WITH REMOTE MOUNTED AUTOMAN

01 KITCHEN HOOD PLAN

SCALE: NONE



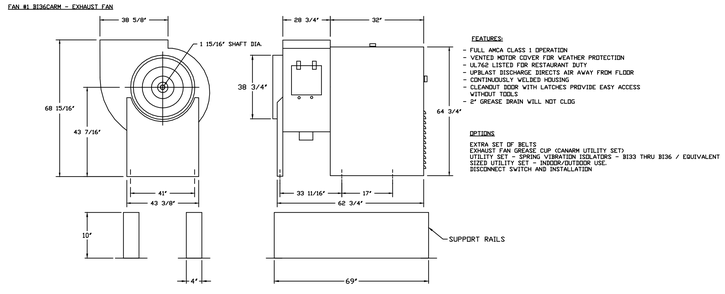
SECTION VIEW – MODEL 6030ND-2 BACK TO BACK WITH PASS THRU

03 KITCHEN HOOD SECTION

SCALE: NONE

02 FIRE SUPPRESSION SYSTEM DETAIL

SCALE: NONE



04 KITCHEN EXHAUST FAN DETAIL

SCALE: NONE

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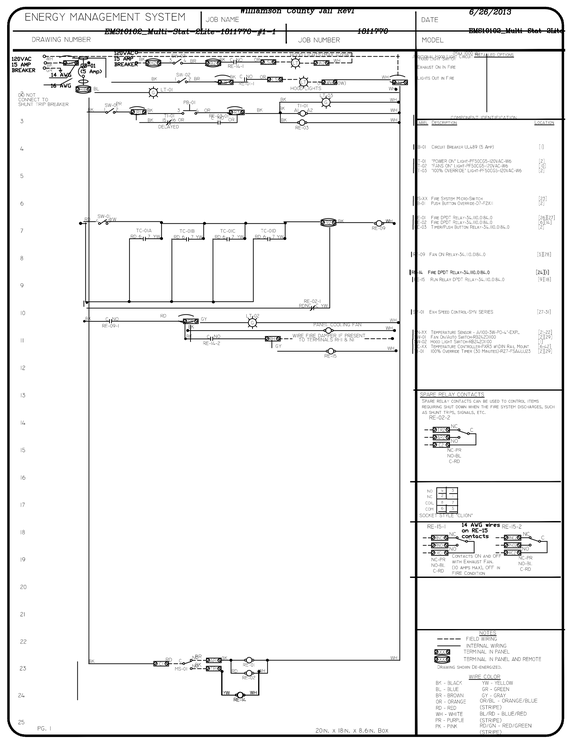
SHEET TITLE
MECHANICAL KITCHEN HOOD DETAILS

M301
SHEET

6/1/2017 8:38 AM
p. 328

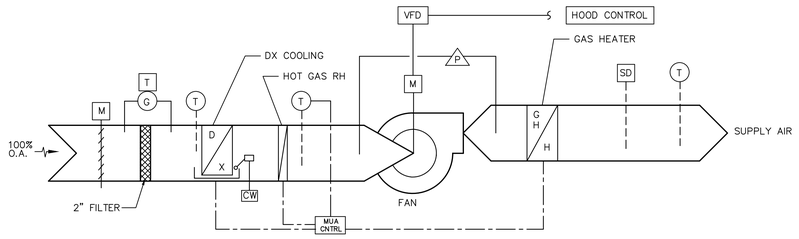
ELECTRICAL PACKAGES

NO.	TAG	PACKAGE #	LOCATION	SWITCHES		OPTION	FANS CONTROLLED				
				LOCATION	QUANTITY		TYPE	ø	H.P.	VOLT	FLA
1		EMS10102_Multi-Stat-2Lite	Wall Utility Cabinet Left	Wall Utility Cabinet Left End	2 Light	EMS 02: Exhaust in Fire, Lights out in Fire	Exhaust	3	10.000	460	12.2
				Hood # 6	1 Fan 1 Other						



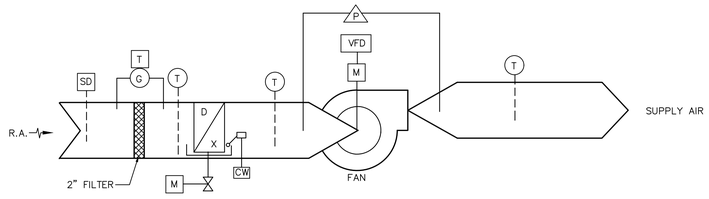
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Williamson County, Texas



A MUA-1 - KITCHEN MAKE-UP AIR UNIT

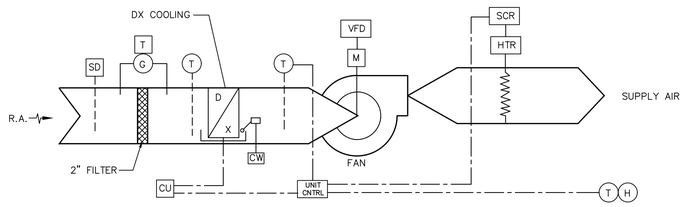
SCALE: NONE



B AHU-1 - KITCHEN CHW SINGLE ZONE VAV

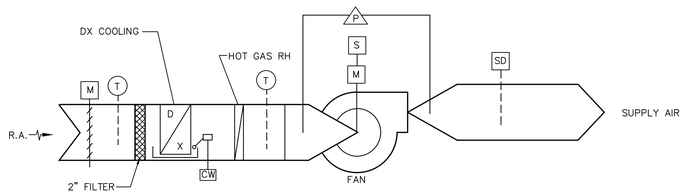
SCALE: NONE

NOTE: OUTSIDE AIR PROVIDED BY MAU-1



C AHU - BASEMENT DX SINGLE ZONE VAV

SCALE: NONE



D OA-1 - BASEMENT CLINIC MAKE-UP AIR 100% OA CAV

SCALE: NONE

SYMBOLS LEGEND

T	THERMOSTAT / TEMPERATURE SENSOR
G	FILTER GAUGE
M	MOTOR OR ACTUATOR
SD	SMOKE DETECTOR
SP	STATIC PRESSURE CONTROLLER
VFD	VARIABLE FREQUENCY DRIVE
CW	HIGH WATER ALARM
MOBD	MANUAL OPPOSED BLADE DAMPER
F	FREEZE THERMOSTAT – LOW LIMIT
P	PRESSURE DIFFERENTIAL SWITCH OR CURRENT SWITCH
H	HUMIDITY CONTROL
H	HUMIDIFIER
T	DWYER SERIES 604D
G	INDICATING TRANSMITTER
S.A.	SUPPLY AIR
R.A.	RETURN AIR
O.A.F.	OUTSIDE AIR FAN
O.A.	OUTSIDE AIR
S	STARTER
R	RELAY
X	OCCUPIED/UNOCCUPIED SWITCH
MES	MANUAL EMERGENCY SHUT DOWN SWITCH
F	FLOW MONITOR/CONTROLLER
SCR	VARIABLE ELECTRIC HEATER CONTROL
HTR	ELECTRIC HEATER

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CHECKED BY: TA

SHEET TITLE
MECHANICAL CONTROLS

M401
SHEET

6/1/2017 8:38 AM

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Williamson County, Texas

SEQUENCE OF OPERATION

MAU-1 KITCHEN PACKAGED MAKEUP AIR UNIT

1. UNIT SHALL BE INTERLOCKED TO START AND STOP FROM SIGNAL FROM KITCHEN EXHAUST HOOD CONTROLLER.
2. UPON STOP SIGNAL, ALL FANS SHALL STOP, ALL DAMPERS SHALL CLOSE AND ALL REFRIGERATION ASSOCIATED WITH THE UNIT SHALL TURN OFF.
3. THE SUPPLY AIR FAN SHALL VARY FROM A SIGNAL FROM THE EXHAUST AN OUTPUT OF THE HOOD CONTROLLER FROM 80% TO 100%.
4. THE HEATING AND COOLING SHALL BE CONTROLLED BY THE UNIT PROVIDED MAKE UP AIR CONTROLLER.
5. SAFETIES AND OVERRIDES:
   A. FIRE: FIRE SIGNAL FROM HOOD SHALL CAUSE THE MAKEUP AIR UNIT TO SHUTDOWN IMMEDIATELY AND ALLOW THE EXHAUST FAN TO CONTINUE TO RUN.
   B. SMOKE: SMOKE DETECTION IN SUPPLY AIR FROM THE UNIT SHALL TURN OFF FANS, CLOSE ALL DAMPERS AND REFRIGERATION, SEND AN ALARM SIGNAL TO THE BMS AND SEND A TROUBLE SIGNAL TO THE FIRE ALARM SYSTEM. AHU SMOKE DETECTION SHALL NOT SEND A GENERAL ALARM SIGNAL. UNIT SHALL RESET FROM CLEARING THE TROUBLE SIGNAL AT THE FIRE ALARM CONTROL PANEL.
   C. HIGH CONDENSATE: A WATER LEVEL SWITCH SHALL DETECT A HIGH CONDENSATE LEVEL IN THE COOLING COIL DRAIN PAN AND SEND AN ALARM TO THE BMS.
   D. FILTERS: A DIFFERENTIAL PRESSURE SWITCH SET APPROPRIATE TO THE MAXIMUM PRESSURE DROP FOR THE FILTER SHALL BE PROVIDED ACROSS FILTER BANK. UPON DETECTION OF HIGH PRESSURE DROP AN ALARM SHALL BE SENT TO THE BMS.

AHU-1 KITCHEN AIR HANDLER CHW SINGLE ZONE VAV

1. UNIT SHALL START, STOP AND BE MONITORED FOR ALARMS AND STATUS OF ALL COMPONENTS BY THE BMS.
2. UPON STOP SIGNAL, FAN SHALL STOP AND ALL VALVES SHALL CLOSE.
3. THE FAN SPEED SHALL VARY FROM 20% TO 100% TO MAINTAIN ROOM TEMPERATURE SENSOR SETPOINT.
4. THE LEAVING AIR TEMPERATURE (LAT) SHALL REMAIN AT CONSTANT 55degF (ADJ) BY MODULATING THE CHILLED WATER VALVE.
5. UPON REACHING MINIMUM AIR FLOW AND THE ROOM TEMPERATURE CONTINUING TO FALL BELOW SETPOINT, THE LAT SHALL RESET UPWARD TO MAINTAIN ROOM SETPOINT.
6. SAFETIES AND OVERRIDES:
   A. FIRE: FIRE SIGNAL FROM HOOD SHALL CAUSE THE UNIT TO SHUTDOWN IMMEDIATELY
   B. SMOKE: SMOKE DETECTION IN SUPPLY AIR FROM THE UNIT SHALL TURN OFF FAN, SEND AN ALARM SIGNAL TO THE BMS AND SEND A TROUBLE SIGNAL TO THE FIRE ALARM SYSTEM. AHU SMOKE DETECTION SHALL NOT SEND A GENERAL ALARM SIGNAL. UNIT SHALL RESET FROM CLEARING THE TROUBLE SIGNAL AT THE FIRE ALARM CONTROL PANEL.
   C. HIGH CONDENSATE: A WATER LEVEL SWITCH SHALL DETECT A HIGH CONDENSATE LEVEL IN THE COOLING COIL DRAIN PAN AND SEND AN ALARM TO THE BMS.
   D. FILTERS: A DIFFERENTIAL PRESSURE SWITCH SET APPROPRIATE TO THE MAXIMUM PRESSURE DROP FOR THE FILTER SHALL BE PROVIDED ACROSS FILTER BANK. UPON DETECTION OF HIGH PRESSURE DROP AN ALARM SHALL BE SENT TO THE BMS.
7. SAFETIES AND OVERRIDES:

AHU-2 BASEMENT SPLIT DX SINGLE ZONE VAV WITH DEHUMIDIFICATION

1. UNIT SHALL START, STOP AND BE MONITORED FOR ALARMS AND STATUS OF ALL COMPONENTS BY THE BMS.
2. UPON STOP SIGNAL, FAN SHALL STOP AND ALL REFRIGERATION SHALL TURN OFF.
3. THE FAN SPEED SHALL VARY FROM 30% TO 100% TO MAINTAIN ROOM TEMPERATURE SENSOR SETPOINT.
4. THE LEAVING AIR TEMPERATURE (LAT) SHALL REMAIN AT CONSTANT 55degF (ADJ) BY MODULATING THE REFRIGERATION COMPONENTS THRU THE UNIT PACKAGED SUCTION PRESSURE CONTROL SYSTEM.
5. ABSENT A CALL FOR DEHUMIDIFICATION, UPON REACHING MINIMUM AIR FLOW AND THE ROOM TEMPERATURE CONTINUING TO FALL BELOW SETPOINT, THE LAT SHALL RESET UPWARD TO MAINTAIN ROOM SETPOINT. WITH SUPPLY AIR AT MINIMUM AND REFRIGERATION COMPLETELY OFF AND ROOM TEMPERATURE FALLS 3degF (ADJ) BELOW SETPOINT, THE HEATER SHALL MODULATE TO MAINTAIN ROOM TEMPERATURE AT 3degF (ADJ) BELOW SETPOINT.
6. UPON A CALL FOR DEHUMIDIFICATION FROM THE ROOM HUMIDITY SENSOR ABOVE 60%RH (ADJ) SETPOINT, THE FAN SHALL GO TO MINIMUM SPEED, THE LAT CONTROL SHALL RESET TO 51degF AND THE HEATER SHALL MODULATE THE SCR CONTROLLER TO MAINTAIN ROOM TEMPERATURE SETPOINT.
7. SAFETIES AND OVERRIDES:
   A. FIRE: FIRE SIGNAL FROM THE FACP SHALL CAUSE THE UNIT TO SHUTDOWN IMMEDIATELY
   B. SMOKE: SMOKE DETECTION IN RETURN AIR FROM THE UNIT SHALL TURN OFF FAN, SEND AN ALARM SIGNAL TO THE BMS AND SEND A TROUBLE SIGNAL TO THE FIRE ALARM SYSTEM. AHU SMOKE DETECTION SHALL NOT SEND A GENERAL ALARM SIGNAL. UNIT SHALL RESET FROM CLEARING THE TROUBLE SIGNAL AT THE FIRE ALARM CONTROL PANEL.
   C. HIGH CONDENSATE: A WATER LEVEL SWITCH SHALL DETECT A HIGH CONDENSATE LEVEL IN THE COOLING COIL DRAIN PAN AND SEND AN ALARM TO THE BMS.
   D. FILTERS: A DIFFERENTIAL PRESSURE SWITCH SET APPROPRIATE TO THE MAXIMUM PRESSURE DROP FOR THE FILTER SHALL BE PROVIDED ACROSS FILTER BANK. UPON DETECTION OF HIGH PRESSURE DROP AN ALARM SHALL BE SENT TO THE BMS.

OA-1 MAKE-UP AIR UNIT FOR CLINIC AREA 100%OA CAV

1. UNIT SHALL BE INTERLOCKED TO START AND STOP FROM SIGNAL FROM EITHER OF THE EXISTING AIR HANDLING UNITS SERVING THE CLINIC.
2. UPON STOP SIGNAL, ALL FANS SHALL STOP, ALL DAMPERS SHALL CLOSE AND ALL REFRIGERATION ASSOCIATED WITH THE UNIT SHALL TURN OFF.
3. THE HEATING AND COOLING SHALL BE CONTROLLED BY THE UNIT PROVIDED MAKE UP AIR CONTROLLER TO PROVIDE A CONSTANT LEAVING AIR TEMPERATURE AS SCHEDULED.
4. SAFETIES AND OVERRIDES:
   A. FIRE: FIRE SIGNAL FROM THE FACP SHALL CAUSE THE UNIT TO SHUTDOWN IMMEDIATELY
   B. SMOKE: SMOKE DETECTION IN RETURN AIR FROM THE UNIT SHALL TURN OFF FAN, SEND AN ALARM SIGNAL TO THE BMS AND SEND A TROUBLE SIGNAL TO THE FIRE ALARM SYSTEM. AHU SMOKE DETECTION SHALL NOT SEND A GENERAL ALARM SIGNAL. UNIT SHALL RESET FROM CLEARING THE TROUBLE SIGNAL AT THE FIRE ALARM CONTROL PANEL.
   C. HIGH CONDENSATE: A WATER LEVEL SWITCH SHALL DETECT A HIGH CONDENSATE LEVEL IN THE COOLING COIL DRAIN PAN AND SEND AN ALARM TO THE BMS.
   D. FILTERS: A DIFFERENTIAL PRESSURE SWITCH SHALL BE PROVIDED ACROSS FILTER BANK. UPON DETECTION OF HIGH PRESSURE DROP AN ALARM SHALL BE SENT TO THE BMS.

DUCTLESS SPLIT SYSTEM

1. INDIVIDUAL SYSTEMS SHALL BE OPERATE THRU ITS PACKAGED CONTROL SYSTEM AND ROOM THERMOSTAT.

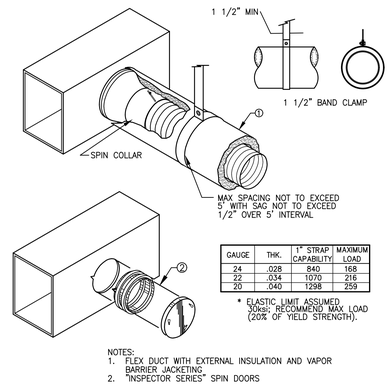
EXHAUST FANS SEQUENCE OF OPERATION

1. THE EXHAUST FANS ARE INTENDED TO RUN CONTINUOUSLY WITH THE STATUS BEING MONITORED BY THE BMS.

| CHW AHU | INPUTS | | | | | | | | | | | | | | | | | | | | | OUTPUTS | | | | | | | | | | | | SOFTWARE FEATURES | | | | | | | | | | | | | | | | | | |

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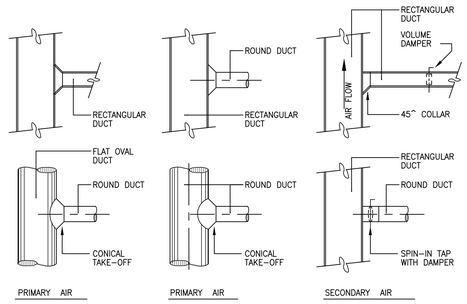


GAUGE	THK.	1" STRAP CAPABILITY	MAXIMUM LOAD
24	.028	840	168
22	.034	1070	216
20	.040	1298	259

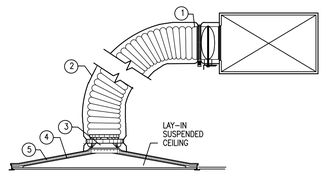
* ELASTIC LIMIT ASSUMED, 30ksi; RECOMMEND MAX LOAD (20% OF YIELD STRENGTH).

NOTES:
1. FLEX DUCT WITH EXTERNAL INSULATION AND VAPOR BARRIER JACKETING.
2. "INSPECTOR SERIES" SPIN DOORS

A MISC. DUCTWORK DETAIL
SCALE: NONE

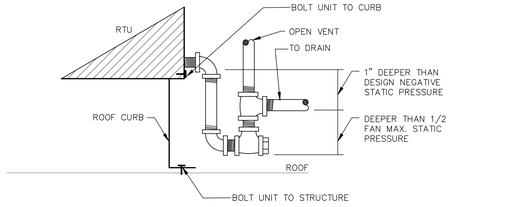


B TYPICAL DUCT TAKE-OFFS
SCALE: NONE



NOTES:
1. SPIN COLLAR TYPE CONNECTOR, EXTERNALLY INSULATED, WITH VOLUME DAMPER AND DAMPER LOCK WITH STAND-OFF
2. PRE-INSULATED FLEX DUCT AS REQUIRED, INSTALLED, PERMANENTLY SEALED AND SUPPORTED TO PREVENT KINKING AND SHARP TURNS
3. ROUND TO SQUARE ADAPTER AS REQUIRED
4. LAY-IN-TYPE CEILING DIFFUSER AS SPECIFIED.
5. PROVIDE 1-1/2" THICK R-6 FOIL BACKED FIBERGLASS INSULATION TO COMPLETELY COVER DIFFUSER CONE SEAL FOIL TO CONE WITH FIBER REINFORCED FOIL BACKED
6. 2-90° TURNS ALLOWED
7. MAXIMUM FLEX LENGTH NOT TO EXCEED 6'-0"
8. SUPPORT SPACING AS SPECIFIED

C LAY-IN CEILING DIFFUSER DETAIL
SCALE: NONE



D CASING DRAIN DETAIL - DRAW THRU
NOT TO SCALE

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CHECKED BY: TA

SHEET TITLE
MECHANICAL DETAILS

M501
SHEET

6/1/2017 8:38 AM

Bid 17105-186

SPLIT-SYSTEM DX AIR CONDITIONING UNIT - BASEMENT

INDOOR UNIT																					OUTDOOR UNIT							
		DX COOLING COIL											ELECTRIC HEATING COIL			ELECTRICAL			MANUFACTURER					ELECTRICAL			MANUFACTURER	
MARK	AREA SERVED	UNIT TYPE	NOMINAL TONS	MAX CFM	MIN CFM	OA CFM	TOTAL MBH	SENS. MBH	ENTERING AIR TEMP (DB/WB)	LEAVING AIR TEMP (DB/WB)	E.S.P. (IN. WG)	MOTOR STARTER	FAN MTR HP	CAPACITY MBH	HEATING STAGES	KW	VOLT/PH	MCA	MOCP	AAON MODEL	WEIGHT	MARK	EER	AMBIENT TEMP	VOLT/PH	MCA	MOCP	AAON MODEL	WEIGHT
AHU-2	BASEMENT	HORIZONTAL	14	4700	1500	0	153.8	121.7	78/65	53.8/53.6	1	VFD	3	51.0	SCR	15	460/3	27	30	H3-DRA	905	CU-2	10.9	105	460/3	32	40	CFA-013	980

SPLIT AC NOTES:
1. Double Wall Cabinet Construction with minimum R-6.25 Value Foam Insulation
2. Direct Drive Supply Fans with premium effeciency motors and VFDs
3. Stainless Steel Drain Pans
4. Hinged Access Doors with Lockable Handles
5. Provide Phase & Brownout Protection - Indoor & Outdoor unit
6. Provide Filter Switch & Magnehelic Gauge
7. Unit MUST have horizontal discharge supply section
8. Cooling Capacities shown are minimum required capacities
9. Variable Capacity Compressors with 10-100% Capacity Control
10. Compressor Shall be located in the Outdoor Unit
11. Provide Fan-Cycling Head Pressure Control on Condesning Unit
12. Provide Suction Pressure Transducer on Lead Refrigeration Circuit

DUCTLESS SPLIT DX HEAT PUMP UNIT SCHEDULE

				COOLING COIL				HEAT PUMP HEATING						CONDENSING UNIT								
				TOTAL	SENS	O.A.	E.A.T.	HEATING @ 47F		ELECTRICAL			LG		AMB.	ELECTRICAL			SEER	REFRIG.	LG
MARK	AREA SERVED	TYPE	CFM	MBH	MBH	TOTAL	DB/WB	MBH	HSPF	VOLT / PH	MCA	MOCP	MODEL	MARK	TEMP	VOLT / PH	MCA	MOCP		TYPE	MODEL
IU-1	KITCHEN OFFICE 103	CEILING MOUNTED	565	18.0	15.0	0	80/67	20.0	10.1	208 / 1	18.1	30	LCN187HV	CU-1	105	208 / 1	18	30	20	R410A	LUU187HV

SPLIT HEAT PUMP UNIT NOTES:
1. PROVIDE REMOTE WALL MOUNTED 7-DAY PROGRAMMABLE THERMOSTAT
2. PROVIDE FACTORY INSTALLED CONDENSATE PUMP
3. MICROPROCESSOR CONTROL
4. FIVE YEAR PARTS & 7 YEAR COMPRESSOR WARRANTY
5. REFRIGERANT LINES TO BE SIZED AND INSTALLED AS PER MANUFACTURER DIRECTIONS
6. DO NOT INSTALL OVER ELECTRICAL EQUIPMENT
7. COORDINATE INSTALLATION WITH CONTRACTOR
8. INDOOR UNIT WILL BE POWERED THROUGH OUTDOOR CONDENSING UNIT - CONNECT POWER AND DISCONNECT TO OUTDOOR UNIT AND THEN RUN WIRE FROM OUTDOOR UNIT TO INDOOR UNIT

CHILLED WATER AIR HANDLING UNIT - KITCHEN

		SUPPLY FAN						CHILLED WATER COIL									ELECTRICAL			MANUFACTURER	
MARK	AREA SERVED	SUPPLY CFM	OA CFM	ESP IN.	DRIVE	MOTOR (HP)	STARTER TYPE	TOTAL MBH	SENS MBH	ENTERING AIR TEMP (DB/WB)	LEAVING AIR TEMP (DB/WB)	MIN. ROWS	MAX. PD (FT)	EWT (F)	LWT (F)	GPM	VOLT/PH	MCA	MOCP	AAON MODEL	WEIGHT-LBS
AHU-1	KITCHEN	5,500	0	1.2	DIRECT	5.0	VFD	237.7	161.7	80/67	52.4/52.1	6	15.1	42	56	34	460/3	10	15	V3-DRB	**750**

NOTES:
1. Double Wall Cabinet Construction with minimum R-6.25 Value Foam Insulation
2. Direct Drive Supply Fans with premium effeciency motors and VFDs
3. Stainless Steel Drain Pans
4. Hinged Access Doors with Lockable Handles
5. Provide Phase & Brownout Protection
6. Provide Filter Switch & Magnehelic Gauge
7. Unit shall have a horizontal discharge supply section
8. Cooling Capacities shown are minimum required capacities

100% OUTSIDE AIR HANDLING UNIT

		COOLING COIL SECTION									REHEAT COIL		ELECTRICAL			MANUFACTURER	
MARK	AREA SERVED	CONDITION OF AIR	SUPPLY OA CFM	E.S.P. (IN. WG)	TOTAL MBH	SENSIBLE MBH	LATENT MBH	EAT DB/WB	LAT DB/WB	MOTOR BHP	MOTOR HP	LAT (DB/WB)	CAP. (MBH)	VOLT/PH	MCA	MOCP	AAON MODEL	WEIGHT-LBS
OA-1	BUILDING AIR HANDLERS	WET CONDITION	2,500	1.5	198.4	91.5	107.0	89/78	53.9/53.7	1.1	2.0	70/59.9	44.0	460/3	35	45	RN-015	1,753
		DRY CONDITION			175.6	126.6	49.1	100/74	50.5/50.3			70/58.3	53.0					

OUTSIDE AIR HANDLING UNIT NOTES:
1. Double Wall Cabinet Construction with minimum 2" R-13 Value Foam Insulation
2. Variable Capacity Compressors with 10-100% Capacity Control
3. Direct Drive Supply Fans with premium effeciency motors and VFDs
4. Stainless Steel Drain Pans
5. Hinged Access Doors with Lockable Handles
6. Factory Installed and Factory Wired Non-Fused Unit Disconnect Switch
7. Factory Installed and Factory Wired 115V GFI Outlet
8. Provide Phase & Brownout Protection
9. Provide Modulating Hot Gas Reheat Coil for Hundity Control - On/Off Reheat Not Acceptable
10. Adjustable Compressor Lockouts
11. Provide Aluminum Mesh Pre-Filters for OA Opening
12. Provide Filter Switch & Magnehelic Gauge
13. Provide Unit with Make-Up Air Controller including all controls and sensors - BacNet Interface to be provided for building DDC connection
14. Provide safety shut down terminal block for installion of smoke detectors
15. Unit MUST have horizontal discharge supply section - Horizontal Discharge Curbs are not acceptable
16. Cooling Capacities shown are minimum required capacities
17. Provide VFDs on Condenser Fans

AIR DEVICE SCHEDULE

MARK	SERVICE	DESCRIPTION	FACE SIZE (SQ IN.)	NECK SIZE (IN.)	FINISH	MANUFACTURER / MODEL NUMBER
A	SUPPLY	SQUARE LOUVERED FACE CEILING DIFFUSER FOR LAY-IN TYPE CEILING, FOUR-WAY THROW, ALL STEEL CONSTRUCTION	24 x 24	SEE PLANS	WHITE	TITUS TMS
A1	SUPPLY	SAME AS TYPE 'A' EXCEPT 12"x12" FACE SIZE	12 x 12	SEE PLANS	WHITE	TITUS TMS
B	RETURN	SQUARE PERFORATED FACE CEILING RETURN AIR GRILLE, STEEL FRAME CONSTRUCTION	24 x 24	SEE PLANS	WHITE	TITUS PAR
B1	RETURN	SAME AS TYPE 'B' EXCEPT 12"x12" FACE SIZE	12 x 12	SEE PLANS	WHITE	TITUS PAR
C	EXHAUST	ALUMINUM CONSTRUCTION, EGGCRATE EXHAUST GRILLE FOR LAY-IN CEILING, SUITABLE FOR DUCTING	24 x 24	SEE PLANS	WHITE	TITUS 50F
C1	EXHAUST	SAME AS TYPE 'C' EXCEPT 12"x12" FACE SIZE	12 x 12	SEE PLANS	WHITE	TITUS 50F
D	SUPPLY	SQUARE PERFORATED FACE CEILING SUPPLY AIR GRILLE, STEEL FRAME CONSTRUCTION, SUITABLE FOR DUCTING	24 x 24	SEE PLANS	WHITE	TITUS PAR
E	SECURITY	SECURITY BARRIER GRILLE WITH FRAME, 3/4" STEEL BARS AND 1/2"x1/4" FLAT BARS LOCATED IN DUCTWORK	2-	SEE PLANS	WHITE	TITUS SF-BG-FM

AIR DEVICE SCHEDULE NOTES:
1. PROVIDE INSULATION BACKS FOR ALL SUPPLY / RETURN AIR DEVICES. (MIN. R-5)
2. PROVIDE GYPBOARD MOUNTING FRAME FOR ALL CEILING MOUNTED DEVICES INSTALLED IN GYPBOARD CEILING (TITUS TRM-S).
3. PROVIDE ALUMINUM OPPOSED BLADE DAMPER IN GRILLE/DIFFUSER NECKS ONLY WHERE INDICATED ON PLANS.
4. PRICE IS CONSIDERED AN EQUIVALENT MANUFACTURER.
5. CONTRACTOR SHALL VERIFY AND COORDINATE ALL FINISHES WITH ARCHITECT.
6. FLEX DUCT SIZE SHALL BE EQUAL TO NECK SIZE (RE: FLEX DUCT SCHEDULE).

TITUS 'TMS' DIFFUSER NECK SIZING SCHEDULE

NECK SIZE DIA. (IN.)	PRIMARY CFM MIN	PRIMARY CFM MAX	TOTAL PRESS AT MAX CFM	NC AT MAX CFM
6	1	90	0.068	17
8	91	250	0.071	20
10	251	380	0.091	22
12	381	500	0.102	25
14	501	700	0.118	26

FAN SCHEDULE

MARK	AREA SERVED	TYPE OF FAN	CFM	S.P. IN. WG	FAN H.P.	MAX RPM	TYPE DRIVE	STARTER	VOLT/PHASE	ACCESSORIES	MANUFACTURER / MODEL NO
F-1	FREEZER / COOLER 'B' DOOR	AIR CURTAIN	1020	0.1	1/5	3600	DIRECT	BREAKER	120/1	1, 2, 3	BERNER EZN1036A
F-2	COOLER 'C' DOOR	AIR CURTAIN	1020	0.1	1/5	3600	DIRECT	BREAKER	120/1	1, 2, 3	BERNER EZN1036A
F-3	COOLER 'D' DOOR	AIR CURTAIN	1020	0.1	1/5	3600	DIRECT	BREAKER	120/1	1, 2, 3	BERNER EZN1036A

FAN SCHEDULE NOTES:
1. FACTORY PRE-WIRED DISCONNECT SWITCH
2. INTERLOCK FAN WITH DOOR
3. STAINLESS STEEL CONSTRUCTION

KITCHEN MAKE-UP AIR UNIT (GAS HEAT)

MARK	MAU-1	
SERVES	KITCHEN HOOD	
SUPPLY AIR (CFM)	12,500	
SUPPLY AIR (CFM) - MINIMUM	6,250	
OUTSIDE AIR (CFM)	12,500	
EXTERNAL STATIC PRESSURE (IN W.C)	1.5	
FAN MOTOR (BHP/HP)	(1) 7.82/10	
FAN DRIVE	DIRECT DRIVE W/ VFD	
REFRIGERANT	R-410A	
NOMINAL COOLING CAPACITY (TONS)	95	
COOLING		
	WET COND.	DRY COND.
ENTERING AIR TEMP (DB/WB)	89/78	100/74
LEAVING AIR TEMP (DB/WB)	52.8/52.6	49.6/49.4
TOTAL CAPACITY (MBH)	1,024	906.2
SENSIBLE CAPACITY (MBH)	470.8	644.9
LATENT CAPACITY (MBH)	553.3	261.26
COMPRESSORS	(3) VARIABLE CAPACITY VFD CONTROLLED	
HOT GAS REHEAT COIL		
LEAVING AIR TEMP (DB/WB)	70/59.4	70/57.8
CAPACITY (MBH)	232	276
HEATING		
GAS HEAT CAPACITY INPUT (MBH)	666.5	
GAS HEAT CAPACITY OUTPUT (MBH)	560.1	
ENTERING AIR TEMP (F)	25	
LEAVING AIR TEMP (F)	66.5	
TEMPERATURE RISE (F)	41.5	
FUEL	NATURAL GAS	
ELECTRICAL		
VOLTS/PH	460/3	
MCA	187	
MOCP	225	
UNIT		
WEIGHT (LBS)	14,473	
MANUFACTURER	AAON	
MODEL NUMBER	RL-095	

KITCHEN MAKE UP AIR UNIT NOTES:
1. Double Wall Cabinet Construction with minimum 2" R-13 Value Foam Insulation
2. Variable Capacity Compressors with VFD Contol - All Compressors
3. Direct Drive Supply Fans with premium effeciency motors and VFDs
4. Stainless Steel Drain Pans
5. Hinged Access Doors with Lockable Handles
6. Factory Installed and Factory Wired Non-Fused Unit Disconnect Switch
7. Factory Installed and Factory Wired 115V GFI Outlet
8. Provide Phase & Brownout Protection
9. Provide Modulating Hot Gas Reheat Coil for Hundity Control - On/Off Reheat Not Acceptable
10. Adjustable Compressor Lockouts
11. Provide Aluminum Mesh Pre-Filters for OA Opening
12. Provide Filter Switch & Magnehelic Gauge
13. Provide Unit with Make-Up Air Controller including all controls and sensors - BacNet Interface to be provided for building DDC connection
14. Provide safety shut down terminal block for installion of smoke detectors
15. Unit MUST have horizontal discharge supply section - Horizontal Discharge Curbs are not acceptable
16. Floor to have aluminum tread plate covering
17. Provide Walk-In Service Compartment
18. All Refrigeration circuits shall be provided with factory installed hot gas bypass
19. Provide Stainless Steel Natural Gas Heat Exchanger - 4 Stages of Control
16. Cooling Capacities shown are minimum required capacities
17. Provide VFDs on Condenser Fans

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WILLIAMSON COUNTY JAIL RENOVATION

306 W. 4TH STREET
GEORGETOWN, TX 78626

MARK	DESCRIPTION	DATE
	CONSTRUCTION DOCS	5.22.17

PROJECT NO:
DRAWN BY: SR
DESIGNED BY: OV
CHECKED BY: TA

SHEET TITLE
MECHANICAL SCHEDULES

M601
SHEET

Williamson County, Texas

6/1/2017 8:38 AM

Bid 1705-166

Williamson County, Texas

KITCHEN EXHAUST FAN SCHEDULE

FAN UNIT TAG	MANUFACTURER/MODEL #	MODEL	CFM	ESP	RPM	H.P.	PH	VOLT	FLA	DISCH. VEL.	WEIGHT	SONES
KEF-1	CAPTIVEAIRE BI36CARM	BI36CARM	11,916	2.5 "	750.00	10.00	3	460	12.2	1545	1,076.0	26

KITCHEN EXHAUST FAN OPTIONS

UNIT TAG	OPTIONS
KEF-1	1 - EXTRA SET OF BELTS
	1 - EXHAUST FAN GREAS CUP (CANNARM UTILITY SET)
	1 - UTILITY SET - SPRING VIBRATION ISOLATORS - BI33 THRU BI36 / EQUIVALENT SIZED UTILITY SET - INDOOR/OUTDOOR USE
	1 - DISCONNECT SWITCH AND INSTALLATION

KITCHEN EXHAUST FAN ACCESSORIES

	EXHAUST			SUPPLY		
FAN UNIT TAG	GREASE CUP	GRAVITY DAMPER	WALL MOUNT	SIDE DISCHARGE	MOTORIZED DAMPER	WALL MOUNT
KEF-1	YES	-	-	-	-	-

KITCHEN HOOD SCHEDULE

HOOD NO.	CAPTIVEAIRE MODEL NO.	LENGTH	MAX. COOKING TEMP	EXHAUST PLENUM						HOOD CONSTRUCTION	HOOD CONFIG.	
				TOTAL EXH. CFM	WIDTH	LENGTH	DIA.	CFM	S.P.		END TO ROW	ROW
1	6030	5' - 0"	600 DEGREES	1,250	10"	12"	2	1250	0.599"	430 SS	LEFT	ALONE
	ND-2									WHERE EXPOSED		
2	6030	10' - 4"	600 DEGREES	2,583	10"	24"	3	2583	0.78"	402 SS	MIDDLE	ALONE
	ND-2									WHERE EXPOSED		
3	6030	11' - 0"	600 DEGREES	2,750	10"	26"	4	2750	0.783"	402 SS	RIGHT	ALONE
	ND-2									WHERE EXPOSED		
4	6030	11' - 0"	600 DEGREES	2,750	10"	26"	4	2750	0.783"	402 SS	LEFT	BACK
	ND-2									WHERE EXPOSED		
5	6030	10' - 4"	600 DEGREES	2,583	10"	24"	3	2583	0.783"	402 SS	MIDDLE	BACK
	ND-2									WHERE EXPOSED		

KITCHEN HOOD OPTIONS

HOOD NO.	FILTERS				LIGHTS			FIRE SYSTEM PIPING	HOOD HANGING WT.
	TYPE	QTY.	HEIGHT	LENGTH	QTY.	TYPE	WIRE GUARD		
1	CAPTRATE SOLO FILTER	3	20"	20"	2	LED	NO	YES	314 LBS.
2	CAPTRATE SOLO FILTER	4	20"	16"	3	LED	NO	YES	503 LBS
		3	20"	20"					
3	CAPTRATE SOLO FILTER	2	20"	16"	4	LED	NO	YES	538 LBS
		5	20"	20"					
4	CAPTRATE SOLO FILTER	2	20"	16"	4	LED	NO	YES	538 LBS
		5	20"	20"					
5	CAPTRATE SOLO FILTER	4	20"	16"	3	LED	NO	YES	503 LBS
		3	20"	20"					

KITCHEN HOOD OPTIONS

HOOD NO.	OPTIONS
1	FIELD WRAPPER 12.00" HIGH FRONT, LEFT
2	FIELD WRAPPER 12.00" HIGH FRONT
3	FIELD WRAPPER 12.00" HIGH FRONT, RIGHT
4	FIELD WRAPPER 12.00" HIGH FRONT, LEFT
5	FIELD WRAPPER 12.00" HIGH FRONT

KITCHEN HOOD - SEQUENCE OF OPERATIONS :

1. ONCE ALL POWER, LIGHTS, AND TEMPERATURE SENSORS ARE PROPERLY CONNECTED AND THE FANS ARE OPERATING IN THE CORRECT DIRECTION, THE POWER LIGHT ON THE CONTROL PANEL SHOULD BE ILLUMINATED. THIS MEANS THAT A 120V CIRCUIT HAS BEEN PROPERLY CONNECTED TO THE TERMINAL BLOCK AT H1 AND N1.

2. PRESS THE "FANS ON" SWITCH TO ENERGIZE THE VARIABLE FREQUENCY DRIVES (VFD'S) AND FANS. THE FANS TAKE A FEW SECONDS TO COME UP TO SPEED; THIS SETTING IS PROGRAMMED INTO THE PANEL FOR A SOFT MOTOR START UP TO PROLONG THE FAN MOTORS. THE VFD'S SHOULD ALL INDICATE 48 HZ AND THE " FANS ON " INDICATOR LIGHT SHOULD BE ILLUMINATE ON THE CONTROL PANEL. THIS INDICATES THAT THE FANS (WHETHER EXHAUST OR SUPPLY) ARE OPERATING ON LOW SPEED.

3. TURN ON THE COOKING APPLIANCES AND ALLOW THEM TO REACH IDLE TEMPERATURE. IF THE FAN SWITCH IS IN THE OFF POSITION, THE FANS SHOULD AUTOMATICALLY BE ENERGIZED AS THE COOKING APPLIANCES HEAT UP. THE EMS THERMOSTAT IN THE RISER IS PRE-SET AT 85 F; WHEN THE SET POITN IS EXCEEDED THIS WILL AUTOMATICALY START THE FANS. THIS FUNCTION ALLOWS THE SYSTEM TO MEET THE REQUIREMENTS OF IMC 507.2.1.1, WHCH REQUIRE EXHAUST FANS TO

4. THE VFD'S ARE FACTORY PROGRAMMED TO OPERATE AT 60HZ FOR HIGH SPEED AND 48HZ FOR LOW SPEED. THIS RESULTS IN A 20% REDUCTION IN AIRFLOOW WHEN OPERATION IS IN LOW SPEED. VFD'S ARE USED TO ADJUST THE SPEED OF 3 PHASE MOTORS AND FREQUENCY IN PROPORTIONAL TO AIRFLOW. THERE IS ONE VFD FOR EACH FAN IN THE SYSTEM.

5. ONCE THE APPLIANCES ARE OPERATING AND THE COOKING PROCESS BEGINS, THE VFD'S WILL BEGIN TO MODULATE BETWEEN 48HZ AND 60 HZ. THE TEMPERATURE CONTROL IS MULTI-FUNCTIONAL AND INCLUDES INPUT FROM THE DUCT MOUNTED THERMOSTAT, RELAY CONTACTS DRIVEN BY PROGRAMMABLE ALARMS AND A SIGNAL OUTPUT TO SPEED UP AND SLOW DOWN THE VFD'S. THERE ARE TWO FACTORY SETTINGS FOR THE TEMPERATURE CONTROLS : 450 DEGREE RATED HOODS ARE PROGRAMMED TO TURN ON 85 F AND GO TO HIGH SPEED AT 90 F, WHILE THE 600-700 DEGREE RATED HOODS ARE PROGRAMMED TO TURN THE FANS ON AT 85 F AND SEND TO HIGH SPEED AT 130 F. ALL TEMPERATURE RANGES ARE ADJUSTABLE IF NECESSARY. PROVIDE VFD SIGNAL OUTPUT TO INTERLOCK WITH KITCHEN MAKE UP

6. THE RESISTANCE TEMPERATURE DETECTOR (RTD), LOCATED IN THE RISER, MEASURES THE TEMPERATURES IN THE DUCT AND GIVES CONSTANT FEED BACK TO THE TEMPERATURE CONTROL PANEL. THERE IS ONE SENSOR PER EXAUST FAN IN THE SYSTEM.

7. A 100% OVERRIDE BUTTON IS ALSO INCLUDED IN THE PACKAGE AND IS INSTALLED ON THE FRONT OF THE PANEL. IF THIS BUTTON IS DEPRESSED, THE FANS WILL AUTOMATICALLY BE RAMPED TO HIGH SPEED VIA THE VFD'S, AND A TIMER IN THE PACKAGE WILL HOLD THE FANS AT HIGH SPPED FOR A SET PERIOD OF TIME. ONCE THE TIME PERIOD HAS EXPIRED, THE VFD'S WILL OPERATE BASED ON THE DUCT TEMPERATURE. THE TIME PERIOD IS FACTORY SET AT 30 MINUTES BUT CAN BE ADJUSTED.

8. AT THE END OF THE DAY OF COOKING IS COMPLETED, THE STAFF WILL TURN OFF THE FAN SWITCH ON THE FRONT OF THE PANE. IF THERE IS ANY RESIDUAL HEAT FROM THE APPLIANCES, THEN THE FANS WILL REMAIN "ON " BASED ON THE DUCT TEMPERATURE UNTIL THE TEMPERATURE FALL BELOW THE SET POINT OF 85 F.

9. IN THE EVENT OF A FIRE UNDER THE HOOD, THE EMS WILL FORCE THE EXHAUST FAN ON AT FULL SPPEED AND SHUT OFF THE SUPPLY FAN.

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M602
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6/1/2017 8:38 AM

Bid 17105-186

Williamson County, Texas

ELECTRICAL SYMBOLS LEGEND

- TELEPHONE OUTLET.
- W WALL MOUNTED TELEPHONE OUTLET. VERIFY 58" MOUNTING HEIGHT WITH ARCHITECT.
- AB MTD. 4" ABOVE BACKSPLASH OR TOP OF COUNTER. COORDINATE AND VERIFY LOCATIONS WITH ARCH. AND SHOP DRAWINGS.
- HPT WALL MOUNTED HANDICAPPED TELEPHONE OUTLET. VERIFY 54" MOUNTING HEIGHT WITH ARCHITECT.
- P PAY TELEPHONE OUTLET.
- DATA/TELECOM OUTLET.
- FLOOR MOUNTED DATA/TELECOM OUTLET.
- DATA OUTLET.
- TV TV OUTLET. INCLUDES REMOTE CONTROL CONNECTIONS WHEN IN PATIENT ROOMS.
- TELEPHONE BACKBOARD. EACH MEASURES 4' X 8' X 3/4" THICK. THIS SPACE IS RESERVED FOR TELECOM TERMINATING BLOCKS.
- GROUND BUSBAR (PROVIDED BY ELECTRICAL CONTRACTOR). MUST BE LOCATED ON THE TELECOM TERMINATING BACKBOARD.
- VI VIDEO INPUT OUTLET.
- PBD PATIENT BED DOCKER/HEADWALL SYSTEM.
- EMS EMS RADIO CONSOLE WITH OR WITHOUT TELEMTRY (MOUNTED ABOVE COUNTER).
- EMSB EMS BASE STATION.
- PBS PAGE BASE STATION.
- RBS 2-WAY RADIO BASE STATION.
- NURSE CALL DOMELIGHT. USE 4X4 BOX, SINGLE GANG OPENING.
- E SINGLE PUSH-BUTTON CALL FOR HELP
- S STAFF STATION.
- D DUTY STATION.
- D V VISUAL DUTY STATION.
- D CB DUTY STATION - ANNUNCIATES CODE BLUE ONLY.
- SD STAFF/DUTY STATION.
- EP EMERGENCY PULL CORD STATION (PULL CORD TO EXTEND WITHIN 2" FROM FLOOR).
- EP WP WATERPROOF EMERGENCY PULL CORD STATION (PULL CORD TO EXTEND WITHIN 2" FROM FLOOR).
- CB CODE BLUE STATION.
- SP SINGLE PATIENT NURSE CALL.
- TV TV REMOTE THROUGH NURSE CALL
- CBJ CODE BLUE JUNCTION BOX.
- NCM NURSE CALL MASTER STATION.
- VNA VISUAL NURSE CALL ANNUNCIATOR.
- CBA CODE BLUE ANNUNCIATOR.
- NCT NURSE CALL TERMINAL CABINET.
- CBT CODE BLUE TERMINAL CABINET.
- $ SINGLE POLE WALL SWITCH.
- $$ DUAL WALL SWITCH. REQUIRES DOUBLE BALLAST ON FIXTURE.
- $3 3-WAY WALL SWITCH.
- $4 4-WAY WALL SWITCH.
- $D DIMMER SWITCH.
- $C LIGHT CONTROL BOX (SUPPLIED WITH LIGHT BY OTHERS).
- $K KEY OPERATED WALL SWITCH.
- $P WALL SWITCH WITH PILOT LIGHT.
- $M MOTOR-RATED MANUAL SWITCH
- M MOTION SENSOR SWITCH

- DUPLEX RECEPTACLE.
- DUPLEX RECEPTACLE ON EMERGENCT CIRCUIT..
- N N INDICATES SPECIAL MOUNTING HEIGHT. COORDINATE AND VERIFY WITH ARCH. AND SHOP DRAWINGS.
- AB MTD 4" ABOVE BACKSPLASH OR TOP OF COUNTER. COORDINATE AND VERIFY LOCATIONS WITH ARCH. AND SHOP DRAWINGS.
- GFI DUPLEX RECEPTACLE ON GROUND FAULT INTERRUPTER CIRCUIT.
- WR WEATHER RESISTANT DUPLEX RECEPTACLE WITH GFI PROTECTION.
- 48" DUPLEX RECEPTACLE # INDICATES AFF.
- QUADRAPLEX RECEPTACLE.
- QUADRAPLEX RECEPTACLE ON EMERGENCY CIRCUIT.
- SPECIAL RECEPTACLE. AS NOTED OR COORDINATE WITH VENDOR
- SIMPLEX 120V RECEPTACLE
- J JUNCTION BOX.
- V JUNCTION BOX FOR FLUSH MOUNT FILM VIEWER.
- D JUNCTION BOX FOR DOOR OPERATOR.
- FLOOR MOUNTED RECEPTACLE.
- PLUGMOLD.
- PUSH BUTTON.
- CLOCK MOUNTED AT 84"AFF UON.
- S CEILING MOUNTED SPEAKER.
- K KEY PAD FOR MAGNETIC DOOR LOCK CONTROL.
- SECURITY CAMERA DOME TYPE
- C SECURITY CAMERA FIXED POSITION
- M SECURITY CAMERA MONITOR
- CR CARD READER FOR DOOR OPENER
- NA NARCOTICS ALARM
- IC TWO-WAY INTERCOMM SYSTEM REMOTE J-BOX
- IM TWO-WAY INTERCOMM SYSTEM MASTER
- FACP FIRE ALARM CONTROL PANEL
- MFACP MAIN FIRE ALARM CONTROL PANEL
- MGAP MASTER MED GAS ALARM PANEL
- GAP MED GAS AREA ALARM PANEL
- GEN GENERATOR ALARM PANEL
- F FIRE ALARM PULL STATION.
- V FIRE ALARM VISUAL DEVICE.
- V CEILING MOUNTED FIRE ALARM VISUAL DEVICE.
- FIRE ALARM AUDIO/VISUAL DEVICE.
- S AREA TYPE SMOKE DETECTOR.
- D DUCT TYPE SMOKE DETECTOR.
- H HEAT DETECTOR.
- R FIRE ALARM RELEASE DEVICE
- SMOKE DOOR HOLD OPEN/RELEASE DEVICE.
- TS SPRINKLER WATER TAMPER SWITCH.
- FS SPRINKLER WATER FLOW SWITCH.
- MOTOR (HP AS INDICATED).
- J 30/3/1 NON-FUSED DISCONNECT SWITCH (SIZE/POLES/ENCLOSURE AS INDICATED).
- J 30/3/20AF/3R FUSED DISCONNECT SWITCH (SIZE/POLES/FUSE/ENCLOSURE AS INDICATED).
- J 00/3R COMBINATION MOTOR STARTER OR STARTER AND DISCONNECT (SIZE/ENCLOSURE AS INDICATED).
- 00/1 MAGNETIC MOTOR STARTER (SIZE/ENCLOSURE AS INDICATED).

- 2' X 4' FLUORESCENT FIXTURE ON NIGHT LIGHT CIRCUIT.
- 2' X 4' FLUORESCENT FIXTURE.
- 2' X 4' FLUORESCENT FIXTURE WITH BATTERY BACK-UP.
- 2' X 2' FLUORESCENT FIXTURE.
- 2' X 2' FLUORESCENT FIXTURE WITH BATTERY BACK-UP.
- 1' X 4' FLUORESCENT FIXTURE.
- 1' X 4' FLUORESCENT FIXTURE WITH BATTERY BACK-UP.
- 6" X 4' FLUORESCENT FIXTURE.
- 6" X 4' FLUORESCENT FIXTURE WITH BATTERY BACK-UP.
- UNDER CABINET FLUORESCENT STRIP FIXTURE.
- UNDER CABINET LIGHT WITH BATTERY BACK-UP.
- WALL MOUNTED LIGHT FIXTURE.
- WALL MOUNTED LIGHT FIXTURE WITH BATTERY BACK-UP.
- EXTERIOR FLOOD LIGHT WITH BATTERY BACK-UP.
- DOWN LIGHT
- DOWN LIGHT WITH BATTERY BACK-UP.
- DOWN LIGHT "WATER PROOF"
- TRACK LIGHTING.
- WALL WASHER.
- WALL SCONCE.
- PENDANT MOUNTED FIXTURE.
- CEILING MOUNTED EXIT SIGN.
- WALL MOUNTED EXIT SIGN.
- WALL MOUNTED EMERGENCY LIGHT FIXTURE W/ BATTERY PACK.
- EXISTING PANEL TO STAY
- EXISTING TRANSFORMER TO STAY
- ES EXISTING POWER OUTLET TO STAY.
- ES EXISTING QUAD POWER OUTLET STAY.
- ES EXISTING PLUGMOLD TO STAY.
- J ES EXISTING J-BOX TO STAY.
- V ES EXISTING DATA OUTLET TO STAY.
- $ ES EXISTING SWITCH TO STAY.
- S ES EXISTING SMOKE DETECTOR TO STAY.
- V ES FIRE ALARM VISUAL DEVICE TO STAY.
- F ES FIRE ALARM PULL DEVICE TO STAY.
- V ES EXISTING CEILING MOUNTED FIRE ALARM DEVICE TO STAY.
- EXISTING FIRE ALARM AUDIO/VISUAL DEVICE TO STAY.
- ES EXISTING EXIT LIGHT TO STAY
- ES EXISTING 2'X4' RECESSED FIXTURE TO STAY
- ES EXISTING 2'X2' RECESSED FIXTURE TO STAY
- ES EXISTING ROUND RECESSED CAN TO BE REMOVE.
- DE EXISTING EXIT LIGHT TO BE REMOVED.
- DE EXISTING POWER OUTLET TO BE REMOVED.
- V DE EXISTING DATA OUTLET TO BE REMOVED.
- DE EXISTING QUAD POWER OUTLET TO BE REMOVED.
- DE EXISTING PLUGMOLD TO BE REMOVED.
- $ DE EXISTING SWITCH TO BE REMOVED.
- DE EXISTING ROUND RECESSED CAN TO BE REMOVE.
- DE EXISTING 2'X2' RECESSED FIXTURE TO BE REMOVED.
- DE EXISTING 2'X4' RECESSED FIXTURE TO BE REMOVED.
- S DE EXISTING SMOKE DETECTOR TO BE REMOVED.
- DE EXISTING CLOCK TO BE REMOVED.
- F DE EXISTING FIRE ALARM PULL TO BE REMOVED.
- V DE FIRE ALARM VISUAL DEVICE TO BE REMOVED.
- S DE CEILING MOUNTED SPEAKER TO BE REMOVED.
- DE EXISTING FIRE ALARM AUDIO/VISUAL TO BE REMOVED.
- ER EXISTING 2'X2' RECESSED FIXTURE TO BE RELOCATED.
- ER EXISTING 2'X4' RECESSED FIXTURE TO BE RELOCATED.
- ER EXISTING ROUND RECESSED CAN TO BE RELOCATED.
- S ER EXISTING SMOKE DETECTOR TO BE RELOCATED.
- F ER EXISTING FIRE ALARM PULL TO BE RELOCATED.
- V ER FIRE ALARM VISUAL DEVICE TO BE RELOCATED.
- S ER CEILING MOUNTED SPEAKER TO BE RELOCATED.
- ER EXISTING FIRE ALARM AUDIO/VISUAL TO BE RELOCATED.

NOTE: NOT ALL SYMBOLS ARE USED

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STATE OF TEXAS
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THE WALLACE GROUP, INC.
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ARCHITECTS
PLANNERS
SURVEYORS
WACO, TEXAS

WILLIAMSON COUNTY JAIL RENOVATION

306 W. 4TH STREET
GEORGETOWN, TX 78626

MARK	DATE	DESCRIPTION
	5.22.17	CONSTRUCTION DOCS

PROJECT NO:
DRAWN BY: PB
DESIGNED BY: OV
CHECKED BY: TA

SHEET TITLE
SYMBOL LEGEND AND NOTES

E000
SHEET

6/1/2017 8:38 AM



GENERAL NOTE:

A. WORK INDICATED ON PLANS REFLECTS ASSUMPTIONS CONCERNING EXISTING CONDITIONS BASED ON BEST AVAILABLE INFORMATION. NO ASSURANCE IS GIVEN THAT THESE ASSUMPTIONS ACCURATELY REFLECT ACTUAL JOB SITE CONDITIONS. BASE BIDS ON MODIFYING EXISTING CONDITIONS AS REQUIRED TO COMPLETE WORK AS INDICATED ON PLANS.

ELECTRICAL DEMO NOTES:

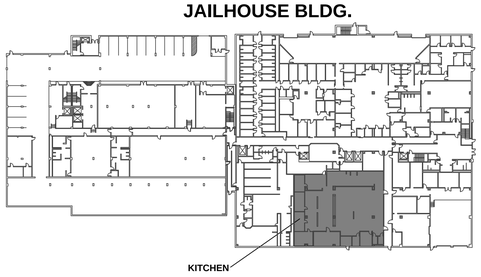
1. DISCONNECT AND REMOVE ALL EXISTING WIRING AND CONDUIT CONNECTED TO EXISTING MAKE UP AIR UNIT.
2. REMOVE EXISTING DISCONNECT AND ALL ASSOCIATED WIRING BACK TO EXISTING PANEL.
3. RELOCATE EXISTING PANELS HK1' HK2 AND TRANSFORMER TE-B1 AS SHOWN ON SHEET E2.1.
4. DISCONNECT AND REMOVE EXISTING LIGHT FIXTURE RETAIN CIRCUIT FOR RECONNECTION TO NEW FIXTURES AS SHOWN ON E1.1. (TYPICAL THIS SYMBOL).
5. DISCONNECT AND REMOVE EXISTING KEF-1 AND ALL ASSOCIATED WIRING BACK TO PANEL.
6. EXISTING FIRE ALARM DEVICE TO REMAIN RELOCATE IN NEW CEILING AS SHOWN ON E201.
7. DISCONNECT AND REMOVE EXISTING FAN COIL UNIT WIRING BACK TO PANEL.
8. DISCONNECT AND REMOVE EXISTING REFRIGERANT UNIT WIRING BACK TO PANEL.
9. DISCONNECT AND REMOVE EXISTING OUTDOOR REFRIGERANT UNIT WIRING BACK TO PANEL.
10. EXISTING INDOOR/OUTDOOR SPLIT DX UNIT SERVING DRY STORAGE ROOM TO REMAIN.
11. DISCONNECT AND REMOVE EXISTING EXHAUST FAN WIRING BACK TO PANEL.

PLAN NORTH

1 ELECTRICAL DEMO PLAN FIRST FLOOR
SCALE: 1/8"=1'0"

0 4 8 12 16 20
GRAPHIC SCALE

KEY PLAN



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SHEET TITLE
ELECTRICAL DEMO PLAN FIRST FLOOR

ED001
SHEET

Williamson County, Texas

6/1/2017 8:38 AM

Bid 17/05-166

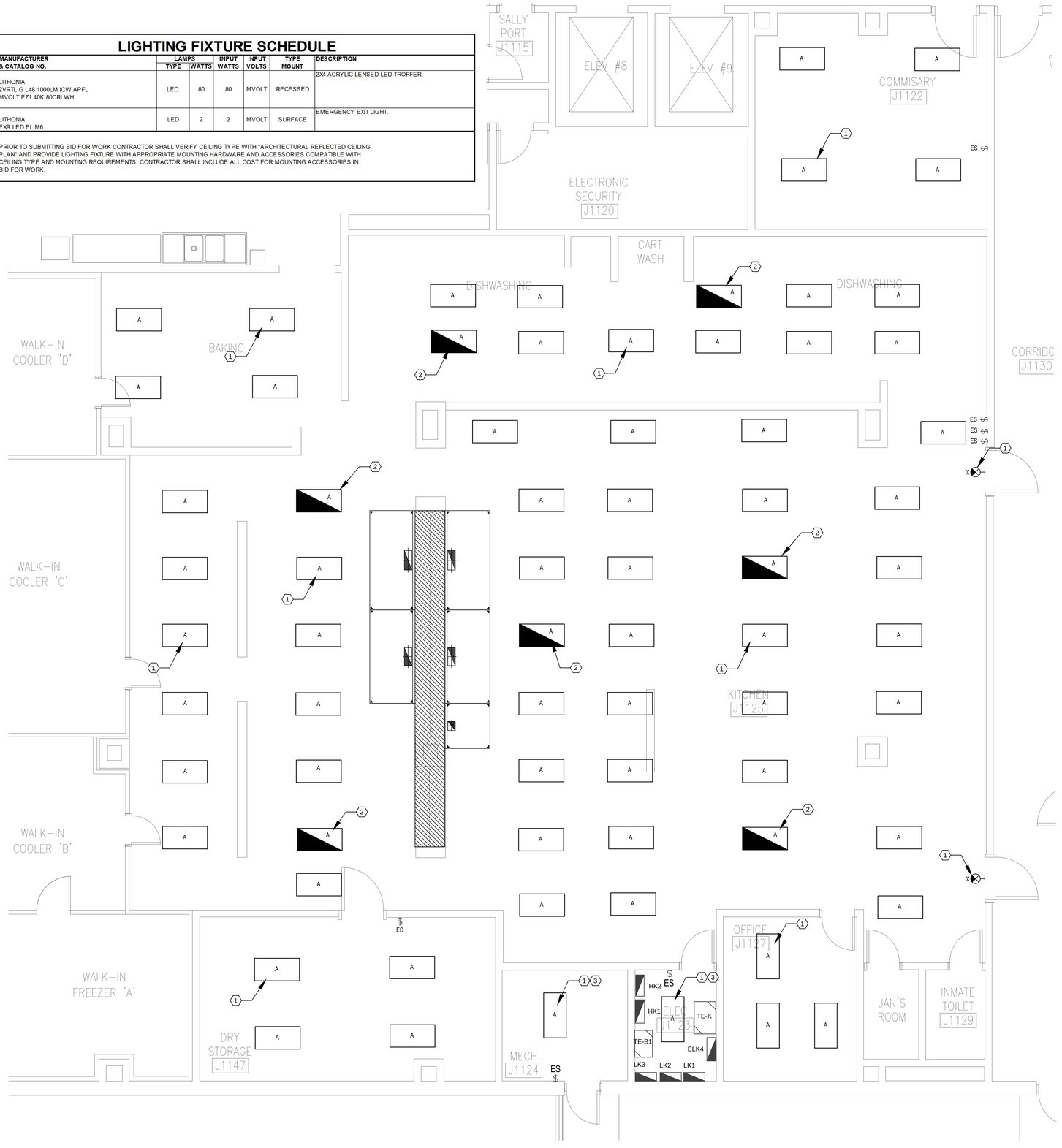
Williamson County, Texas

LIGHTING FIXTURE SCHEDULE

MARK	MANUFACTURER & CATALOG NO.	LAMPS TYPE	LAMPS WATTS	INPUT WATTS	INPUT VOLTS	TYPE MOUNT	DESCRIPTION
A	LITHONIA 2VRTL G L48 1000LM ICW APFL MVOLT EZ1 40K 80CRI WH	LED	80	80	MVOLT	RECESSED	2X4 ACRYLIC LENSED LED TROFFER.
X	LITHONIA EXR LED EL M6	LED	2	2	MVOLT	SURFACE	EMERGENCY EXIT LIGHT.

NOTES:

1 PRIOR TO SUBMITTING BID FOR WORK CONTRACTOR SHALL VERIFY CEILING TYPE WITH "ARCHITECTURAL REFLECTED CEILING PLAN" AND PROVIDE LIGHTING FIXTURE WITH APPROPRIATE MOUNTING HARDWARE AND ACCESSORIES COMPATIBLE WITH CEILING TYPE AND MOUNTING REQUIREMENTS. CONTRACTOR SHALL INCLUDE ALL COST FOR MOUNTING ACCESSORIES IN BID FOR WORK.



PLAN NORTH

1 ELECTRICAL LIGHTING PLAN FIRST FLOOR

SCALE: 1/4"=1'0"

0 4 8 12 16 20

GRAPHIC SCALE

GENERAL NOTE:

A. WORK INDICATED ON PLANS REFLECTS ASSUMPTIONS CONCERNING EXISTING CONDITIONS BASED ON BEST AVAILABLE INFORMATION. NO ASSURANCE IS GIVEN THAT THESE ASSUMPTIONS ACCURATELY REFLECT ACTUAL JOB SITE CONDITIONS. BASE BIDS ON MODIFYING EXISTING CONDITIONS AS REQUIRED TO COMPLETE WORK AS INDICATED ON PLANS.

PLAN KEYED NOTES:

1. CONNECT TO EXISTING LIGHT FIXTURE CIRCUIT. (TYPICAL ALL FIXTURES IN THIS AREA).
2. CONNECT TO EXISTING NIGHT LIGHT CIRCUIT. (TYPICAL).
3. RECONNECT TO EXISTING SWITCH.

COMcheck Software Version 4.0.5.5

Interior Lighting Compliance Certificate

Project Information

Energy Code: 2015 IECC
Project Title: Williamson County Jail Renovation
Project Type: Alteration

Construction Site:
508 S. Rock St.
Georgetown TX, TX

Owner/Agent:
Williamson County
3151 S.E. Inner Loop, Ste B
Georgetown Texas, TX 78626

Designer/Contractor:
Philip Barousse
Talex Inc, Engineers
6300 La Calma
Suite 100
Austin, TX 78752
512-451-6579

Allowed Interior Lighting Power

A Area Category	B Floor Area (ft2)	C Allowed Watts / ft2	D Allowed Watts (B X C)
1-Kitchen and Dining (Courthouse/Police Station/Penitentiary:Penitentiary Dining Area)	6300	0.96	6048
		Total Allowed Watts =	6048

Proposed Interior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
Kitchen and Dining (Courthouse/Police Station/Penitentiary:Penitentiary Dining Area 6300 sq.ft.)				
LED 1: Type A: 2x4 REcessed: LED Other Fixture Unit 50W:	2	77	50	3850
		Total Proposed Watts =		3850

Interior Lighting PASSES

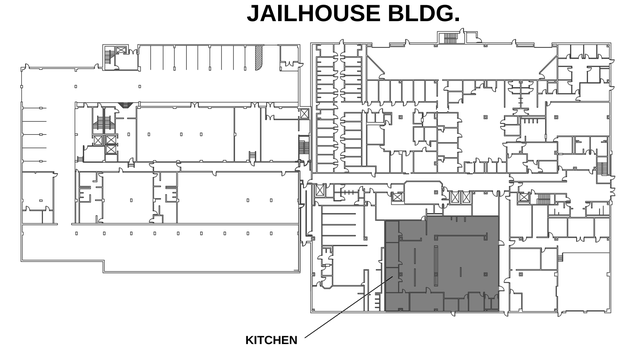
Interior Lighting Compliance Statement

Compliance Statement: The proposed interior lighting alteration project represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed interior lighting systems have been designed to meet the 2015 IECC requirements in COMcheck Version 4.0.5.5 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Thomas R. Alexander, P.E. — Tom Alexander — 5.22.17
Name - Title — Signature — Date

Project Title: Williamson County Jail Renovation — Report date: 05/24/17
Data filename: I:\1066 WilcoJail\Schedules\Com Check\Wilco Jail.cck — Page 1 of 5

KEY PLAN



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STATE OF TEXAS — Thomas R. Alexander — 43239 — REGISTERED — PROFESSIONAL ENGINEER

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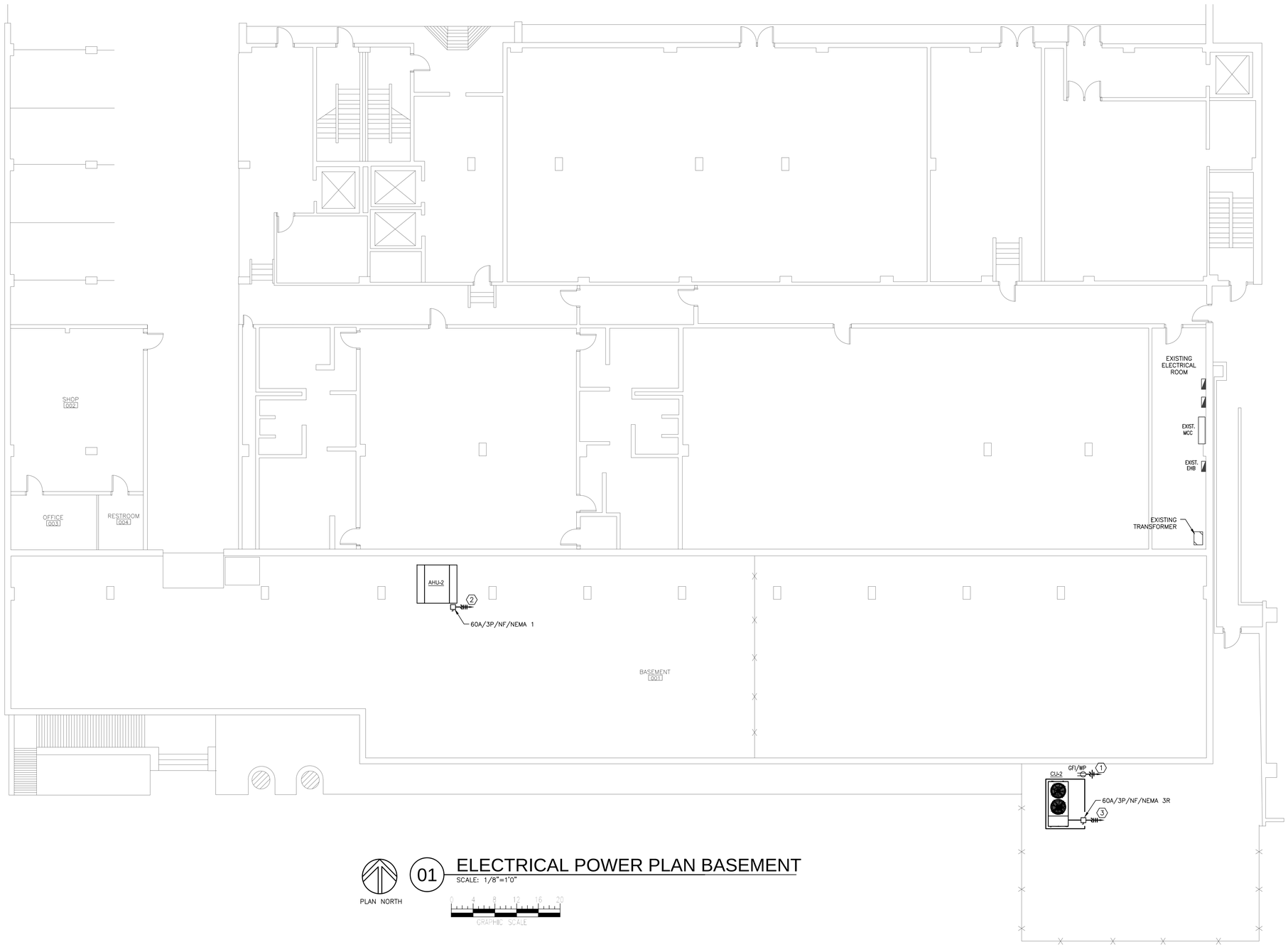
SHEET TITLE
ELECTRICAL LIGHTING PLAN FIRST FLOOR

E101
SHEET

6/1/2017 8:38 AM

Bid 17/05-166

Williamson County, Texas



PLAN NORTH

01 ELECTRICAL POWER PLAN BASEMENT

SCALE: 1/8"=1'0"

0 4 8 12 16 20

GRAPHIC SCALE

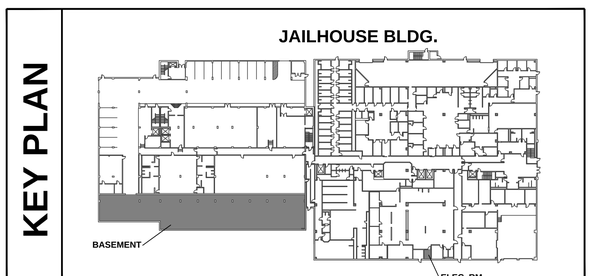
GENERAL NOTE:

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PLAN KEYED NOTES:

1. CONNECT TO NEAREST 120V CIRCUIT.
2. CONNECT TO PROVIDED 480V/3P/50A CIRCUIT BREAKER IN EXISTING PANEL EHB.
3. CONNECT TO PROVIDED 480V/3P/40A CIRCUIT BREAKER IN EXISTING PANEL EHB.

KEY PLAN



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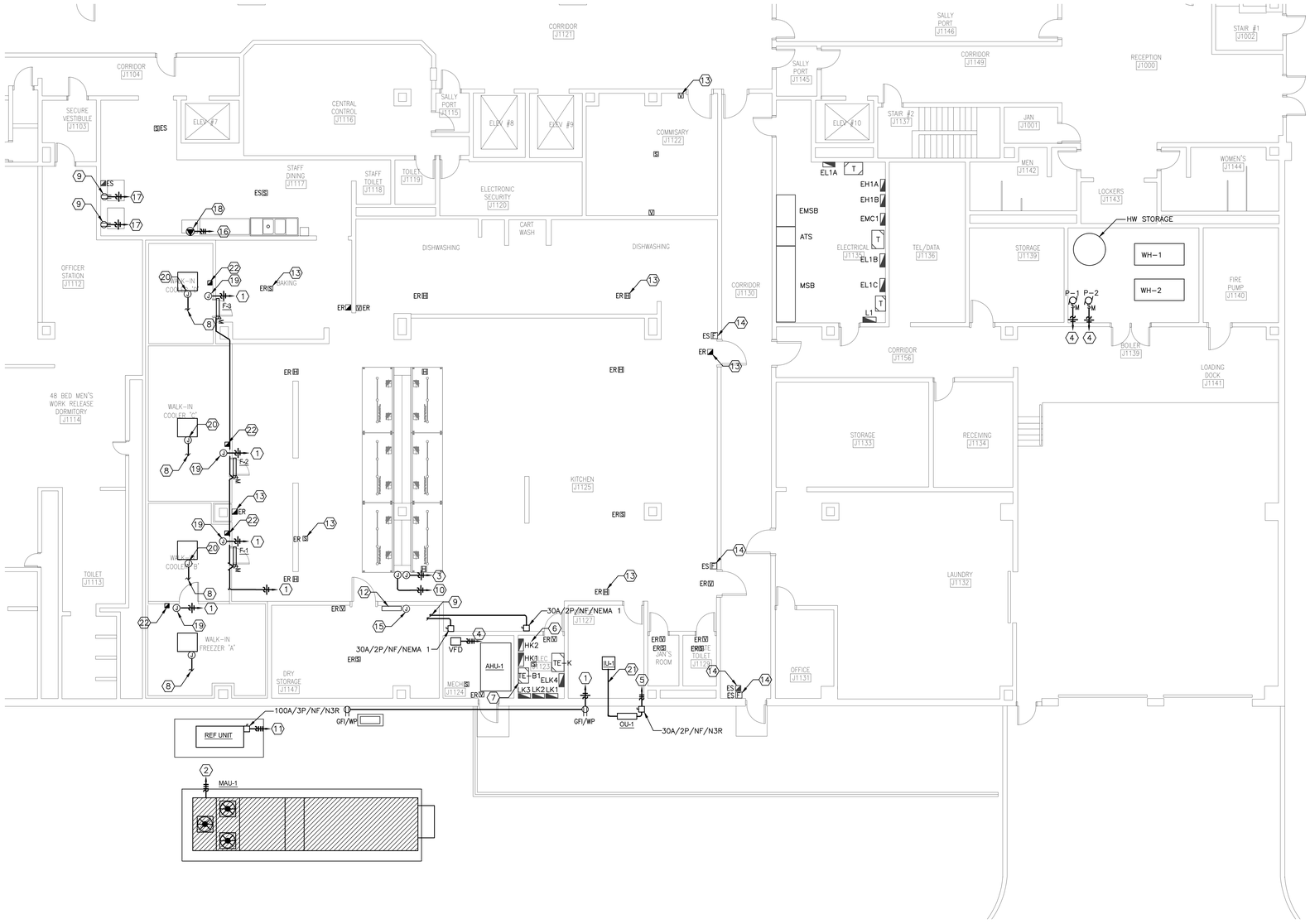
PROJECT NO:
DRAWN BY: PB
DESIGNED BY: OV
CHECKED BY: TA

SHEET TITLE
ELECTRICAL POWER PLAN BASEMENT

E200
SHEET

6/1/2017 8:39 AM

Bid 17105-166
Williamson County, Texas



GENERAL NOTE:

A. WORK INDICATED ON PLANS REFLECTS ASSUMPTIONS CONCERNING EXISTING CONDITIONS BASED ON BEST AVAILABLE INFORMATION; NO ASSURANCE IS GIVEN THAT THESE ASSUMPTIONS ACCURATELY REFLECT ACTUAL JOB SITE CONDITIONS. BASE BIDS ON MODIFYING EXISTING CONDITIONS AS REQUIRED TO COMPLETE WORK AS INDICATED ON PLANS.

PLAN KEYED NOTES:

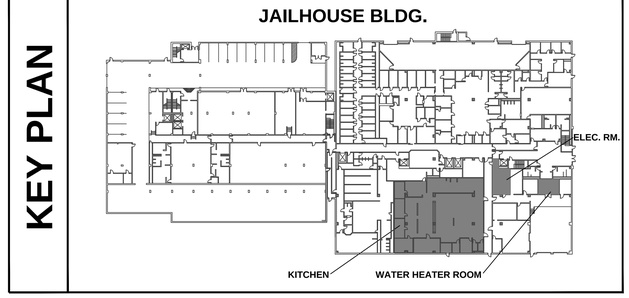
1. CONNECT TO SPARE 120V/20A CIRCUIT BREAKER IN EXISTING PANEL LK3.
2. CONNECT TO PROVIDED 480V/3P/225A CIRCUIT BREAKER IN EXISTING PANEL HK1.
3. CIRCUIT FOR HOOD CONTROL PANEL CONNECT TO SPARE 120V/1/20A CIRCUIT BREAKER IN EXISTING PANEL ELK4
4. CONNECT TO PROVIDED 120V/1P/20A CIRCUIT BREAKER IN EXISTING PANEL LK3.
5. CONNECT TO PROVIDED 208V/2P/30A CIRCUIT BREAKER IN EXISTING PANEL LK3.
6. RELOCATE EXISTING PANELS HK1 AND HK2 AS SHOWN RECONNECT EXISTING CIRCUITS.
7. RELOCATE EXISTING TRANSFORMER TO CEILING SPACE SUSPEND FROM STRUCTURE ABOVE.
8. CONNECT 120V/1/20A CIRCUIT TO CONTROL PANEL IN REFRIGERATION UNIT.
9. 120V/20A NEMA 5-15 POWER OUTLET.
10. CIRCUIT FOR HOOD LIGHTS CONNECT TO SPARE 120V/1/20A CIRCUIT BREAKER IN EXISTING PANEL ELK4.
11. CONNECT TO PROVIDED 208V/3P/90A CIRCUIT BREAKER IN EXISTING PANEL ELK4.
12. FIRE SUPPRESSION SYSTEM CABINET REFER TO MECHANICAL DRAWINGS.
13. EXISTING FIRE ALARM DEVICE RELOCATE TO NEW CEILING (TYPICAL THIS SYMBOL).
14. EXISTING FIRE ALARM DEVICE TO REMAIN (TYPICAL THIS SYMBOL).
15. EXISTING J-BOX RECONNECT EXISTING CIRCUIT ELK4-17 TO NEW FIRE ALARM SUPPRESSION SYSTEM CABINET.
16. CONNECT TO PROVIDED 208V/2P/20A CIRCUIT BREAKER IN EXISTING PANEL EL1A.
17. CONNECT TO PROVIDED 120V/20A CIRCUIT BREAKER IN EXISTING PANEL EL1A.
18. 208V/2P POWER OUTLET FOR EXACT TYPE COORDINATE WITH EQUIPMENT SUPPLIER.
19. J-BOX FOR CONNECTING 120V/20A POWER TO COOLER /FREEZER, LIGHT, DOOR HEATER, AND ALARM.
20. J-BOX FOR CONNECTING POWER TO EVAPORATOR.
21. PROVIDE 1/2"C FROM CU TO IU WITH CONDUCTORS PER EQUIPMENT MFGR'S INSTRUCTIONS.
22. PROVIDE NEW A/V FIRE ALARM DEVICE AND CONNECT TO EXISTING FIRE ALARM SYSTEM.

PLAN NORTH

01 ELECTRICAL POWER PLAN FIRST FLOOR
SCALE: 1/8"=1'0"

0 4 8 12 16 20
GRAPHIC SCALE

KEY PLAN



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STATE OF TEXAS
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ARCHITECTS
PLANNERS
SURVEYORS
WACO, TEXAS

WILLIAMSON COUNTY JAIL RENOVATION
306 W. 4TH STREET
GEORGETOWN, TX 78626

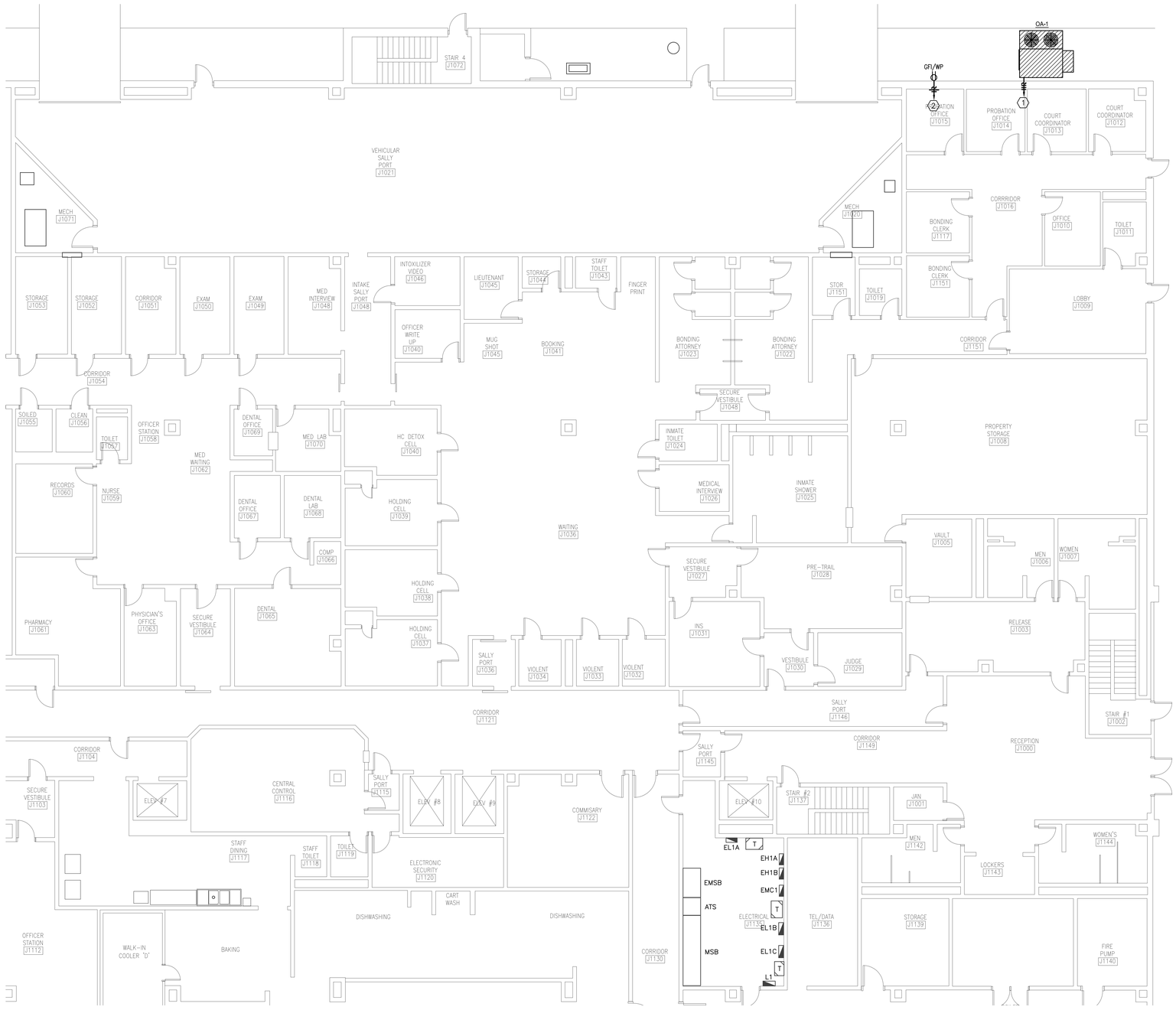
MARK	DATE	DESCRIPTION
	5.22.17	CONSTRUCTION DOCS

PROJECT NO:
DRAWN BY: PB
DESIGNED BY: OV
CHECKED BY: TA

SHEET TITLE
ELECTRICAL POWER PLAN FIRST FLOOR

E201
SHEET

6/1/2017 8:38 AM
p. 339



GENERAL NOTE:

A. WORK INDICATED ON PLANS REFLECTS ASSUMPTIONS CONCERNING EXISTING CONDITIONS BASED ON BEST AVAILABLE INFORMATION. NO ASSURANCE IS GIVEN THAT THESE ASSUMPTIONS ACCURATELY REFLECT ACTUAL JOB SITE CONDITIONS. BASE BIDS ON MODIFYING EXISTING CONDITIONS AS REQUIRED TO COMPLETE WORK AS INDICATED ON PLANS.

PLAN KEYED NOTES:

1. CONNECT TO PROVIDED 480V/45A CIRCUIT BREAKER IN EXISTING PANEL EH1.
2. CONNECT TO SPARE 120V/1P 20A CIRCUIT BREAKER IN EXISTING PANEL EL1.

NORTH

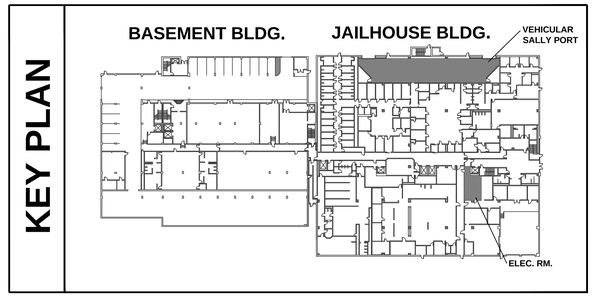
01 ELECTRICAL PLAN FIRST FLOOR

SCALE: 1/8"=1'0"

0 4 8 12 16 20

GRAPHIC SCALE

KEY PLAN



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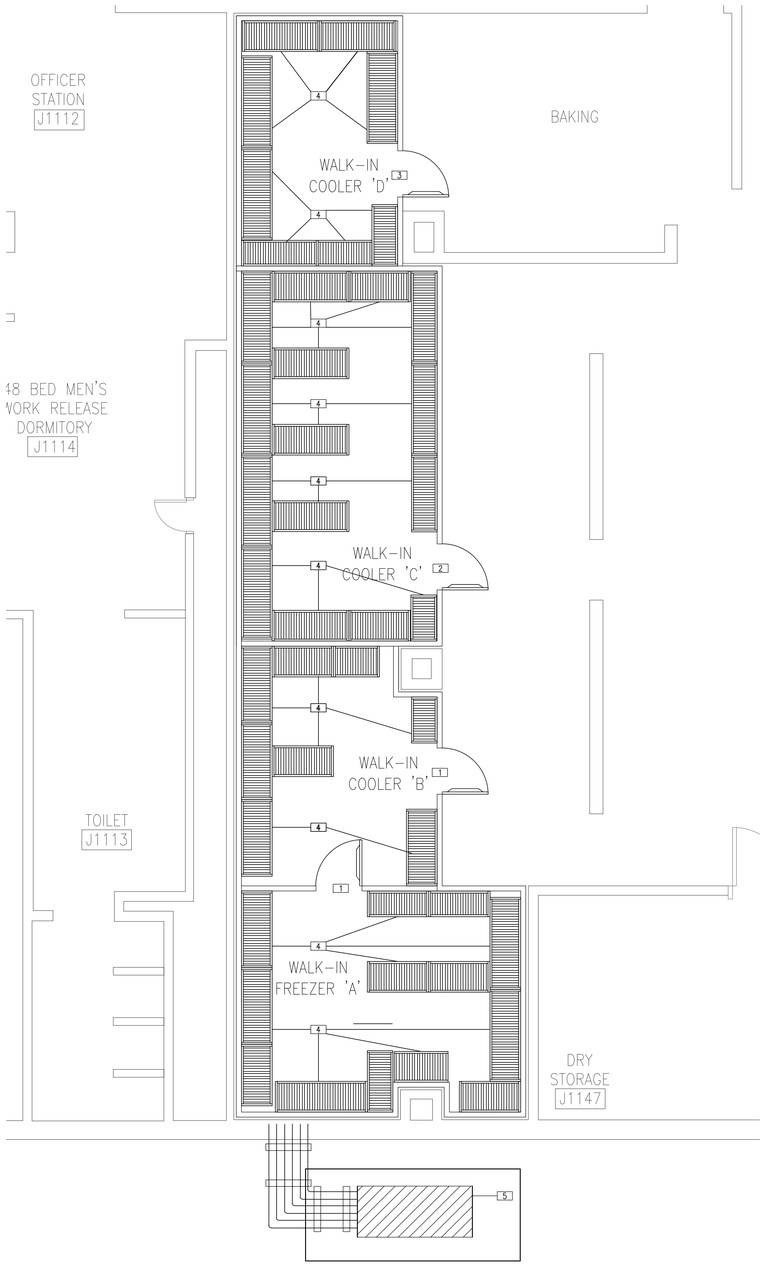
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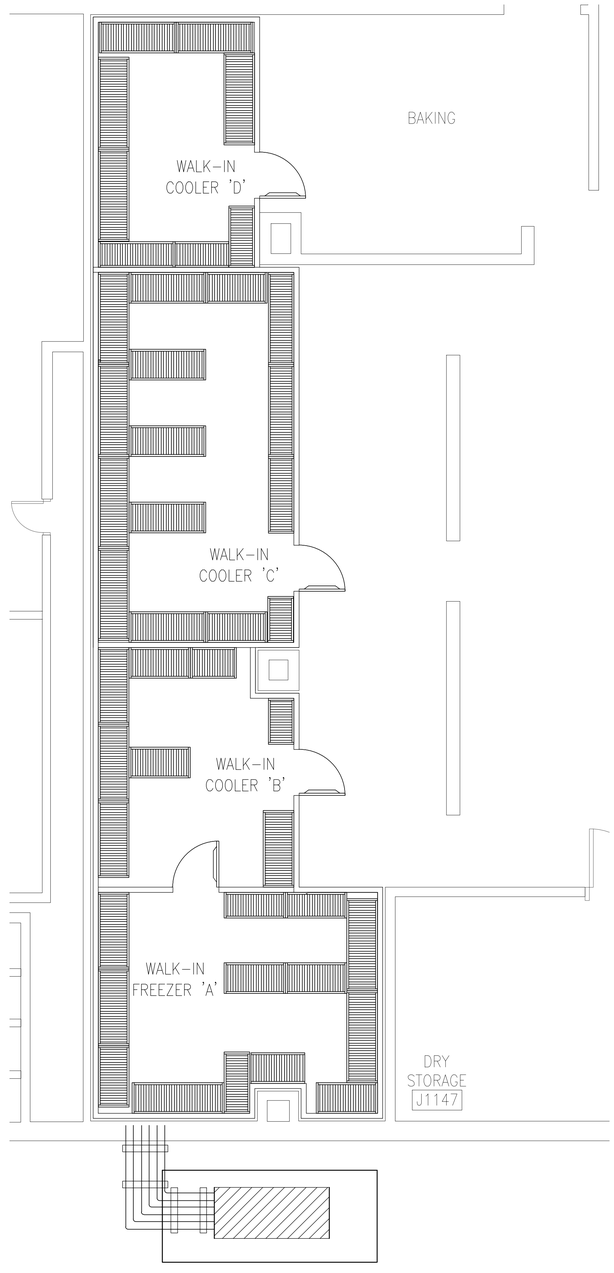
SHEET TITLE
ELECTRICAL PLAN
FIRST FLOOR

E202
SHEET

Bid 1705-186
Williamson County, Texas



OUTDOOR AIR-COOLED REFRIGERATION SYSTEM



OUTDOOR AIR-COOLED REFRIGERATION SYSTEM

PLUMBING SYMBOLS

●	C.W.	COLD WATER		FS	FLOOR SINK
●	H.W.	HOT WATER		EVC	EXHAUST VENT CONNECTION
	G	GAS SUPPLY		SVC	SUPPLY VENT CONNECTION
	SS	STEAM SUPPLY		FR	DIRECT CONN. FLUE RISER
	CR	CONDENSATE RETURN		FT	FLOOR TROUGH
	DD	DIRECT DRAIN		AFF	ABOVE FINISHED FLOOR
	HD	HUB DRAIN		SUFF	STUB UP FROM FLOOR
	FD	FLOOR DRAIN		SDFC	STUB DOWN FROM CEILING
	FFD	FLOOR DRAIN W/ FUNNEL		BTC	BRANCH TO CONNECTION

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J. COUNIHAN, IIDA #306879
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AND THE FOOD SERVICE INDUSTRY

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WILLIAMSON COUNTY JAIL RENOVATION

306 W. 4TH STREET
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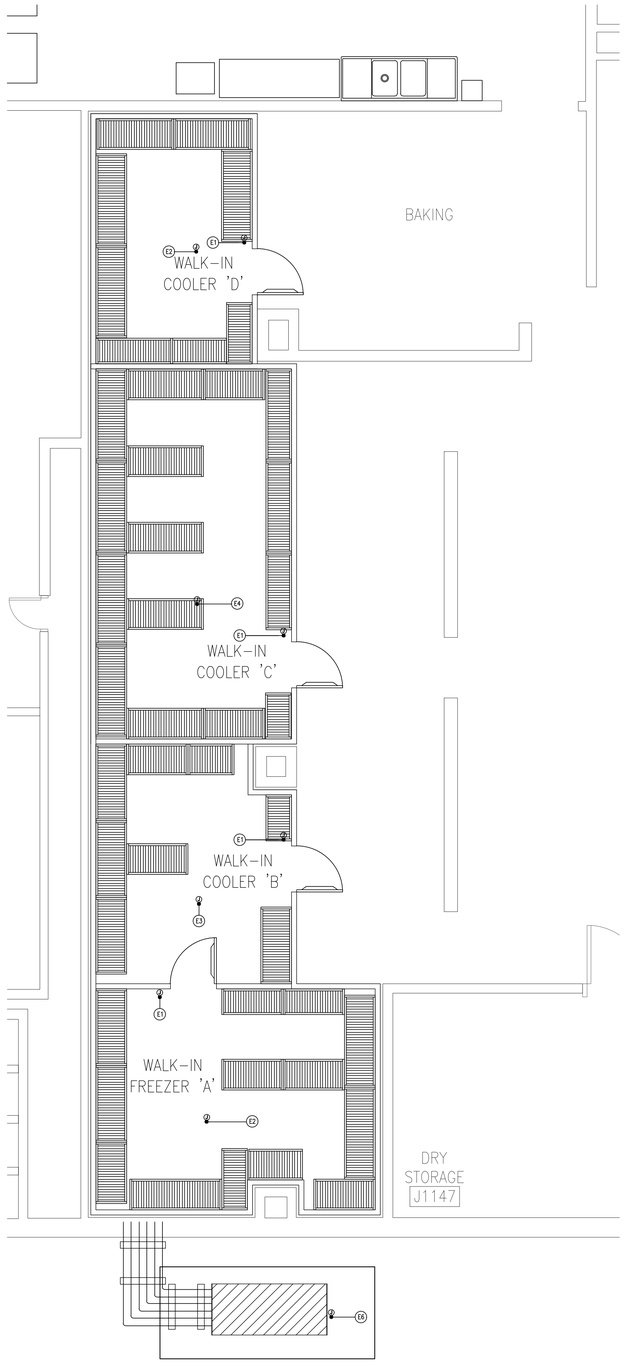
SHEET TITLE
KITCHEN EQUIPENT LAYOUT

K100
SHEET

6/1/2017 8:33 AM
p. 341

Bid 17/05-166

Williamson County, Texas



OUTDOOR AIR-COOLED REFRIGERATION SYSTEM

WILLIAMSON COUNTY JAIL KITCHEN EQUIPMENT ELECTRICAL SCHEDULE		
ITEM	QTY	DESCRIPTION
E1	4	JB-120/60/1PH SDFC BTC @COOLER/FREEZER, LIGHT, DOOR HEATER & ALARM, 5 AMPS EA.
E2	1	JB-208/60/1PH SDFC BTC @WALK-IN FREEZER "A" EVAPORATOR, 2.3 AMPS
E3	1	JB-115/60/1PH SDFC BTC @WALK-IN COOLER "B" EVAPORATOR, 1.8 AMPS
E4	1	JB-115/60/1PH SDFC BTC @WALK-IN COOLER "C" EVAPORATOR, 3.6 AMPS
E5	1	JB-115/60/1PH SDFC BTC @WALK-IN COOLER "D" EVAPORATOR, 2.7 AMPS
E6	1	NEW AIR-COOLED OUTDOOR REFRIGERATION SYSTEM CONDENSING UNIT CONSISTING OF

GENERAL ELECTRICAL NOTES:

ALL LABOR AND MATERIAL REQUIRED TO MAKE FINAL CONNECTION FROM ROUGH-INS TO EQUIPMENT ARE TO BE BY ELECTRICAL CONTRACTOR. ELECTRICIAN TO CONNECT ALL ELELCTRICAL EQUIPMENT AND FIXTURES AND DO ANY INTERNAL WIRING REQUIRED IN THE FIXTURES AS CALLED FOR IN THE SPECIFICATIONS. ALL DISCONNECT SWITCHES REQUIRED ARE TO BE FURNISHED AND INSTALLED BY THE ELECTRICIAN AT THE TIME OF INSTALLATION.

OUTLET COVER PLATES ARE TO BE STAINLESS STEEL AND ARE TO BE FURNISHED BY THE ELECTRICIAN AS WELL AS THE RECEPTACLE, UNLESS OTHERWISE SPECIFIED IN THE ITEM SPECIFICATIONS. ELECTRICIAN TO PROVIDE LABOR AND MATERIAL FOR INTER-CONNECTING OF ADJACENT EQUIPMENT AND CONNECTING OF EQUIPMENT AT FIELD JOINTS.

ALL ROUGH-INS AND FINAL CONNECTIONS ARE TO BE PERFORMED IN FULL ACCORDANCE WITH ALL APPLICABLE CODES RELATING TO INSTALLATION AND HOOK-UP OF EQUIPMENT. ALL EQUIPMENT MUST BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

ALL ELECTRICAL OUTLETS AND REQUIREMENTS ON THIS PLAN ARE FOR FIXTURES AND EQUIPMENT SPECIFIED AS FURNISHED BY THE KITCHEN EQUIPMENT CONTRACTOR. FOR ANY ADDITIONAL BUILDING ELECTRICAL REQUIREMENTS, SEE OTHER PLANS.

ALL DIMENSIONS GIVEN ARE FROM COLUMN CENTERLINE AND/OR FINISHED WALLS.

ELECTRICAL SYMBOLS
SYMBOLS AND ABBREVIATIONS

- TELEPHONE JACK
- FLOOR MTD. TELEPHONE JACK
- DATA JACK
- FLOOR MTD. DATA JACK
- SINGLE OUTLET
- DUPLEX OUTLET- WALL MTD.
- DUPLEX OUTLET- FLOOR MTD.
- DUPLEX OUTLET- CLG MTD.
- QUADRUPLEX OUTLET-WALL MTD.
- QUADRUPLEX OUTLET- FLOOR MTD.
- QUADRUPLEX OUTLET- CLG MTD.

ELECTRICAL SYMBOLS
SYMBOLS AND ABBREVIATIONS

- GFI GROUND FAULT INT. OUTLET
- SWITCHED OULTET
- SPECIAL OUTLET
- T CABLE JACK
- JUNCTION BOX
- JB JUNCTION BOX
- QPO QUADRUPLEX OUTLET
- CO CONVENIENCE
- SUFF STUB UP FROM FLOOR
- SDFC STUB DOWN FROM CEILING
- @ AT
- AFF ABOVE FINISH FLOOR
- BTC BRANCH TO CONNECTION

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FOR THE HOSPITALITY INDUSTRY
AND THE FOOD SERVICE INDUSTRY

SHEET TITLE
KITCHEN EQUIPENT ELECTRICAL ROUGH-INS

K101
SHEET

6/1/2017 8:38 AM

WALK - IN SPECIFICATIONS

Combo

OVERALL SIZE: 71'-10 1/2" X 18'-10 1/2" X 8'-10 1/4"

PANELS
FOAMED IN PLACE URETHANE FOAM 4"

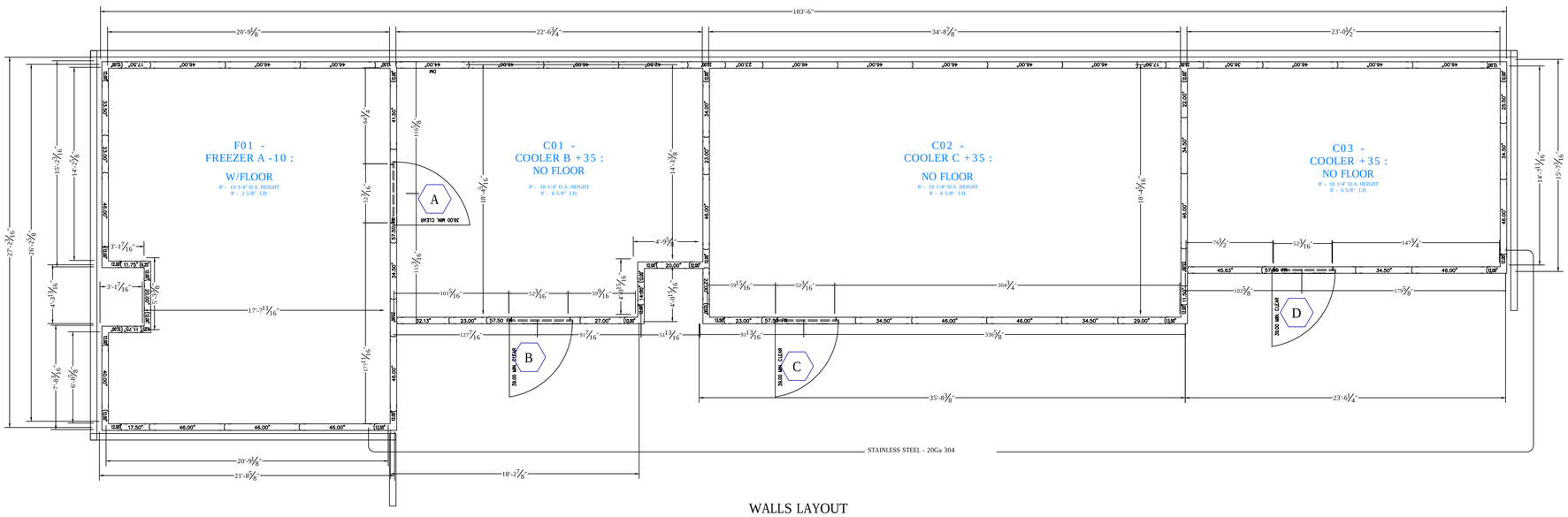
EXTERIOR FINISH
WALL: GALVALUME - EMBOSSED 26 GA EXCEPT AS NOTED
TOP COOLERS: GALVALUME - EMBOSSED 26 GA
TOP FREEZER:GALVANIZED SMOOTH 20Ga WITH SUPPORT CHANNEL
FLOOR: GALVALUME - EMBOSSED 26 GA

INTERIOR FINISH
WALL: GALVALUME - EMBOSSED WHITE 26GA.
TOP: GALVALUME - EMBOSSED WHITE 26GA.

FLOOR TYPE
F01 FREEZER A -10 : ALUMINUM - DIAMOND TREAD .100
C01 COOLER B +35 : SCREED, VINYL 4" X 4" HIGH
C02 COOLER C +35 : SCREED, VINYL 4" X 4" HIGH
C03 COOLER +35 : SCREED, VINYL 4" X 4" HIGH

WALK-IN ACCESSORIES
(18) LIGHT FIXTURE, KASON 1810LX 48" LED (WITH DIODE STRIPS)

REFRIGERATION
NONE



WALLS LAYOUT

⚠ATTENTION

1. DRAWING NOT INTENDED FOR INSTALLATION - DESIGN APPLICATION ONLY.
2. ALL WALK-INS ARE DESIGNED FOR INDOOR APPLICATION UNLESS NOTED OTHERWISE
3. PENETRATIONS AND SEALING OF ARE THE RESPONSIBILITY OF OTHERS
4. ALLOW 2" MINIMUM CLEARANCE WITH AIRFLOW OF 5 CFM PER 100 SQ FT AROUND ENTIRE PANEL SURFACES
5. GENERAL CONTRACTOR TO REFER TO DESIGN AND SPECIFICATION MANUAL FOR FLOOR DETAIL INFORMATION
6. QUARRY TILE OR CONCRETE FLOOR APPLICATIONS: METAL PANEL FACING MAY BE SUSCEPTIBLE TO STAINING DUE TO EXCESSIVE MOISTURE CREATED BY THE HYDRATION OF CONCRETE TYPE MATERIALS. IT IS ABSOLUTELY NECESSARY THAT EACH ROOM BE PROPERLY VENTILATED. SPECIAL PRECAUTIONS MUST ALSO BE TAKEN WHEN USING MURIATIC ACID DUE TO EFFECTS HYDROCHLORIC FUMES HAVE ON METAL MATERIALS
7. PANEL LAYOUT MAY CHANGE BASED ON OPTIMAL MANUFACTURING STANDARDS
8. WALK-IN TOP IS NOT DESIGNED FOR FOOT TRAFFIC OR STORAGE UNLESS NOTED OTHERWISE
9. IF CONDENSING UNIT IS LOCATED IN THE INTERIOR OF BUILDING A MINIMUM OF 24" OF CLEARANCE IS REQUIRED AROUND TOP AND SIDES
10. FLOOR, CURB, AND PIT DETAILS ARE FOR GENERAL REFERENCE ONLY. THESE DRAWINGS SHOULD NOT BE USED OR INCORPORATED IN THE DESIGN OR PREPARATION OF THE INSULATED FLOOR, SUB-SLAB OR CURBS, WITHOUT HAVING THE DESIGN REVIEWED BY A QUALIFIED ENGINEER. ALL FOOTINGS, FOUNDATION WALLS AND CONCRETE WEAR SLABS ARE THE RESPONSIBILITY OF THE BUILDING ENGINEER OR ARCHITECT.
11. THE FOAM PLASTIC USED IN THIS PRODUCT COMPLIES TO THE IBC SECTION 2603 AS FOLLOWS: FLAME SPREAD RATING; 20; SMOKE DEVELOPED RATING: 450; FLASH IGNITION TEMPERATURE RATING: 915°f; SPONTANEOUS IGNITION TEMPERATURE RATING: 950°f.

FOR APPROVAL
YOU MUST REVIEW ALL NOTES, DETAILS, DIMENSIONS, FINISHES, DOORS SIZES, LOCATIONS AND SWINGS

☐ APPROVAL- NO CHANGE REQUIRED, MANUFACTURE AS DRAWN.

☐ APPROVED AS NOTED- MAKE REQUIRED CHANGES AND MANUFACTURE AS DRAWN.

☐ NOT APPROVED- DESIGN CHANGES REQUIRE DRAWING REVISION AND RESUBMISSION.

DATE:_____ BY:_____

SMOOTH FINISH DISCLAIMER

Panels with non-textured and/or no-profile panel finishes (smooth finishes) on the exterior and interior faces may exhibit "oil canning" and flatness imperfections on the surface. Our standard panels have a stucco embossed texture on both faces that helps to reduce oil canning and any other irregularities in the exposed surface. Please be aware of this potential situation in your specification process. Such "oil canning" and flatness issues are typical and are not covered under standard warranties.

DRAWING #: A100206R8
UNIT #: 001
ORDER #:

Kolpak
2915 Tecumseh Creek Parkway, Parsons, TN 38363
Ph: 800.541.6244 Fax: 731.847.0007
A Manitowoc Company

WILLIAMSON COUNTY JAIL
N/A
GEORGETOWN,TX 78626 USA

E-SOURCE INC.

DRAWN BY:	DATE:	CHECK BY:	DATE:	QUOTE REVISION	DATE:
RND	4.25.17	GKS	4.25.17		
EEP	5.17.17	DWP	5.17.17		

SHEET #
AD-2 of 3

TALLEY inc, engineers
6300 La Calma, Suite 100
Austin, Texas 78752
Texas Firm #: 3271
Ph: 512.451.6579 Fax: 512.451.6678

STATE OF TEXAS
Thomas R. Alexander
43239
REGISTERED PROFESSIONAL ENGINEER

THE WALLACE GROUP, INC.
ENGINEERS
ARCHITECTS
PLANNERS
SURVEYORS
WACO, TEXAS

MARK	DESCRIPTION	DATE
	CONSTRUCTION DOCS	5.22.17

PROJECT NO:
DRAWN BY:
DESIGNED BY:
CHECKED BY: TA

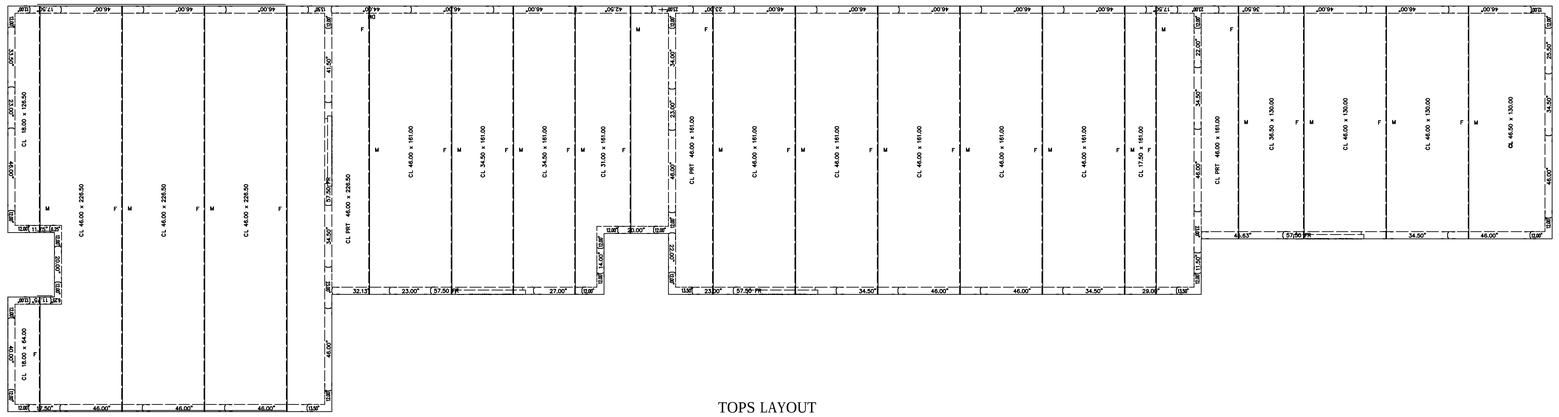
SHEET TITLE
KITCHEN FREEZER DETAILS

K102
SHEET

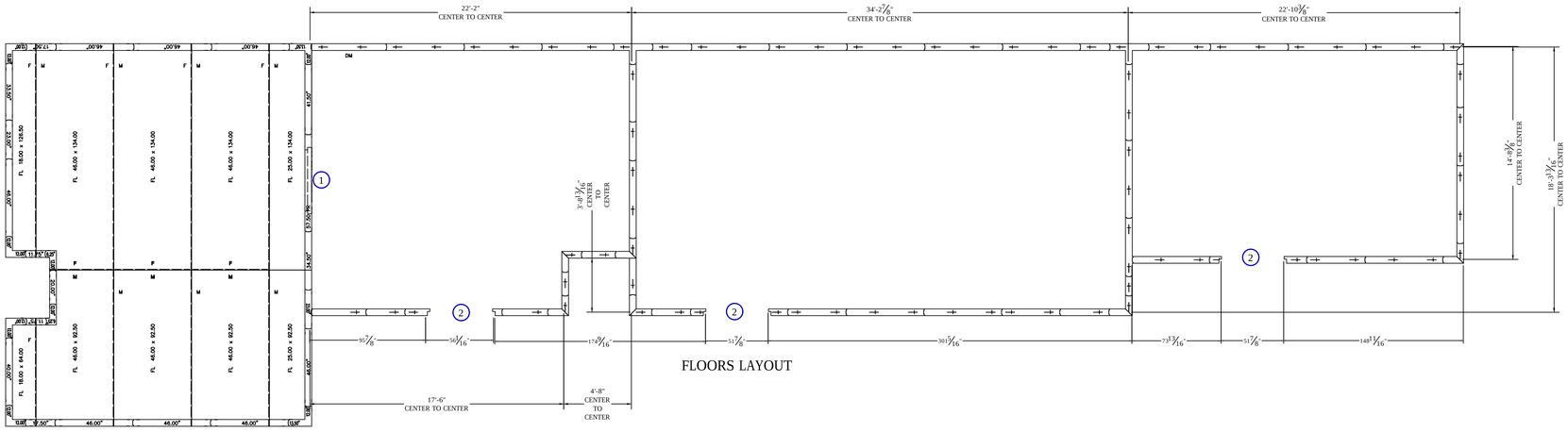
WILLIAMSON COUNTY JAIL RENOVATION
306 W. 4TH STREET
GEORGETOWN, TX 78626

Bid 17/05-186
Williamson County, Texas

WALK - IN SPECIFICATIONS



TOPS LAYOUT



FLOORS LAYOUT

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UNIT #: 001
ORDER #:

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2915 Tech Center Drive, Santa Ana, CA 92705
714.384.0644 Fax 714.384.0741
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N/A
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TAILOR inc, engineers
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	EEP	5.17.17	DWP	5.17.17		

SHEET #
AD-2 of 3

PROJECT NO:
DRAWN BY:
DESIGNED BY:
CHECKED BY: TA

SHEET TITLE
KITCHEN FREEZER DETAILS

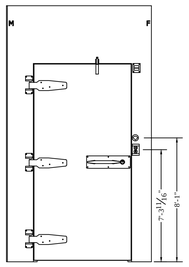
K103
SHEET

WILLIAMSON COUNTY
JAIL RENOVATION
306 W. 4TH STREET
GEORGETOWN, TX 78626

6/1/2017 8:38 AM

Bid 17105-166

Williamson County, Texas



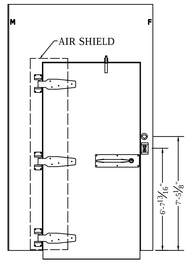
FRAME:
RECESSED 4" WITH 0" LEVELING SAND AND 0" TILE AND GROUT
EXT: GALVALUME - EMBOSSED WHITE 26GA.
INT: GALVALUME - EMBOSSED WHITE 26GA.

PLUG:
EXT: GALVALUME - EMBOSSED WHITE 26GA.
INT: GALVALUME - EMBOSSED WHITE 26GA.

HARDWARE AND ACCESSORIES:
(1) THRU CEILING ELECTRICAL (ALL CONDUIT CONCEALED)
(1) VENT - PRESSURE RELIEF, HEATED KASON 1825 (STD)
(1) LIGHT FIXTURE W/TAMPERPROOF SCREWS - KASON 1808NM LED
(1) THERMOMETER - 2 INCH DIAL W/6' LEAD (STD)
(1) SWITCH - PILOT LIGHT INCLUDED UL (STD)
(1) THRESHOLD, FRP
(1) HEATER WIRE, 2.5 WATT / FT
(1) DOOR CLOSER WITH TAMPERPROOF SCREWS - KASON 1094 POLISHED CHROME
(1) LATCH WITH TAMPERPROOF SCREWS - KASON 57 DEADBOLT
(3) HINGE WITH TAMPERPROOF SCREWS - DENT 310S (SPRING ASSIST) S/S POLISHED

OFFSET 1.25
DR 36.00" x 78.00"
FR 57.50" x 102.25"
DW-1
A

DOOR ELECTRICAL INFORMATION				
DESCRIPTION	QTY	VOLT	AMP	AMP LOAD
FLUORESCENT LIGHT	0	115	1.7	0.0
LED LIGHT	4		0.4	1.6
HEATER WIRE	1		0.9	0.9
DIGITAL THERMOMETER	0		0.1	0.0
HEATED AIR VENT	1		0.1	0.1
HEATED VIEWPORT	0		0.9	0.0
AIR SHIELD	0		1.4	0.0
IN/OUT BUZZER	0		0.1	0.0
MODULARM 75/75B OR DATALARM	0		6.0	0.0
OTHER ALARMS	0		1.0	0.0
115 VOLT, SINGLE PHASE, 60 Hz, TOTAL DOOR AMPS:				2.6



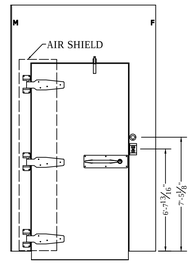
FRAME:
RECESSED 0" WITH 0" LEVELING SAND AND 0" TILE AND GROUT
EXT: STAINLESS STEEL - 20GA 304
INT: GALVALUME - EMBOSSED WHITE 26GA.

PLUG:
EXT: STAINLESS STEEL - 20GA 304
INT: GALVALUME - EMBOSSED WHITE 26GA.

HARDWARE AND ACCESSORIES:
(1) THRU CEILING ELECTRICAL (ALL CONDUIT CONCEALED)
(1) AIR SHIELD
(1) LIGHT FIXTURE W/TAMPERPROOF SCREWS - KASON 1808NM LED
(1) THERMOMETER - 2 INCH DIAL W/6' LEAD (STD)
(1) SWITCH - PILOT LIGHT INCLUDED UL (STD)
(1) DOOR CLOSER WITH TAMPERPROOF SCREWS - KASON 1094 POLISHED CHROME
(1) LATCH WITH TAMPERPROOF SCREWS - KASON 57 DEADBOLT
(3) HINGE WITH TAMPERPROOF SCREWS - DENT 310S (SPRING ASSIST) S/S POLISHED

OFFSET 4.25
DR 36.00" x 78.00"
FR 57.50" x 98.25"
DW-2
B

DOOR ELECTRICAL INFORMATION				
DESCRIPTION	QTY	VOLT	AMP	AMP LOAD
FLUORESCENT LIGHT	0	115	1.7	0.0
LED LIGHT	3		0.4	1.2
HEATER WIRE	0		0.9	0.0
DIGITAL THERMOMETER	0		0.1	0.0
HEATED AIR VENT	0		0.1	0.0
HEATED VIEWPORT	0		0.9	0.0
AIR SHIELD	1		1.4	1.4
IN/OUT BUZZER	0		0.1	0.0
MODULARM 75/75B OR DATALARM	0		6.0	0.0
OTHER ALARMS	0		1.0	0.0
115 VOLT, SINGLE PHASE, 60 Hz, TOTAL DOOR AMPS:				2.6



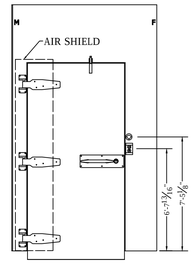
FRAME:
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EXT: STAINLESS STEEL - 20GA 304
INT: GALVALUME - EMBOSSED WHITE 26GA.

PLUG:
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INT: GALVALUME - EMBOSSED WHITE 26GA.

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(1) AIR SHIELD
(1) LIGHT FIXTURE W/TAMPERPROOF SCREWS - KASON 1808NM LED
(1) THERMOMETER - 2 INCH DIAL W/6' LEAD (STD)
(1) SWITCH - PILOT LIGHT INCLUDED UL (STD)
(1) AIR SHIELD
(1) DOOR CLOSER WITH TAMPERPROOF SCREWS - KASON 1094 POLISHED CHROME
(1) LATCH WITH TAMPERPROOF SCREWS - KASON 57 DEADBOLT
(3) HINGE WITH TAMPERPROOF SCREWS - DENT 310S (SPRING ASSIST) S/S POLISHED

OFFSET -1.50
DR 36.00" x 78.00"
FR 57.50" x 98.25"
DW-3
C

DOOR ELECTRICAL INFORMATION				
DESCRIPTION	QTY	VOLT	AMP	AMP LOAD
FLUORESCENT LIGHT	0	115	1.7	0.0
LED LIGHT	4		0.4	1.6
HEATER WIRE	0		0.9	0.0
DIGITAL THERMOMETER	0		0.1	0.0
HEATED AIR VENT	0		0.1	0.0
HEATED VIEWPORT	0		0.9	0.0
AIR SHIELD	1		1.4	1.4
IN/OUT BUZZER	0		0.1	0.0
MODULARM 75/75B OR DATALARM	0		6.0	0.0
OTHER ALARMS	0		1.0	0.0
115 VOLT, SINGLE PHASE, 60 Hz, TOTAL DOOR AMPS:				3.0



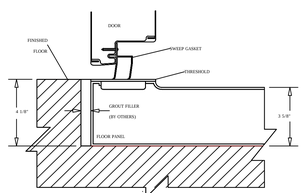
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EXT: STAINLESS STEEL - 20GA 304
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EXT: STAINLESS STEEL - 20GA 304
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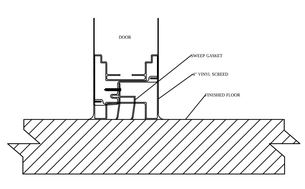
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(1) AIR SHIELD
(1) LIGHT FIXTURE W/TAMPERPROOF SCREWS - KASON 1808NM LED
(1) THERMOMETER - 2 INCH DIAL W/6' LEAD (STD)
(1) SWITCH - PILOT LIGHT INCLUDED UL (STD)
(1) AIR SHIELD
(1) DOOR CLOSER WITH TAMPERPROOF SCREWS - KASON 1094 POLISHED CHROME
(1) LATCH WITH TAMPERPROOF SCREWS - KASON 57 DEADBOLT
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OFFSET -3.50
DR 36.00" x 78.00"
FR 57.50" x 98.25"
DW-4
D

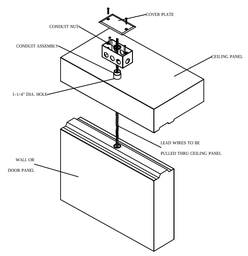
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DIGITAL THERMOMETER	0		0.1	0.0
HEATED AIR VENT	0		0.1	0.0
HEATED VIEWPORT	0		0.9	0.0
AIR SHIELD	1		1.4	1.4
IN/OUT BUZZER	0		0.1	0.0
MODULARM 75/75B OR DATALARM	0		6.0	0.0
OTHER ALARMS	0		1.0	0.0
115 VOLT, SINGLE PHASE, 60 Hz, TOTAL DOOR AMPS:				2.6



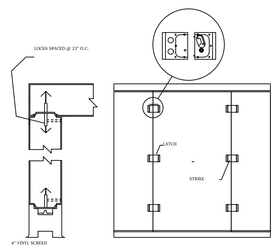
1 DETAIL - 41N FLOOR- 41N RECESS
Scale: NTS



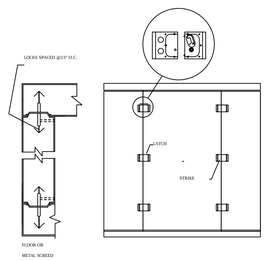
2 DETAIL - 41N VSCD
Scale: NTS



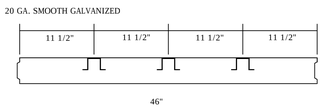
3 DETAIL - THRU CEILING ELECTRIC
Scale: NTS



4 DETAIL - PANEL CONNECTION AT 41N VINYL SCREEDS
Scale: NTS



5 DETAIL - PANEL CONNECTION AT FLOORS OR METAL SCREEDS
Scale: NTS



SUPER CEILING REINFORCEMENT

6 DETAIL - SUPER CEILING
Scale: NTS

JHC, engineers
6300 La Calma, Suite 100
Austin, Texas 78752
Texas Firm F-3271
Ph: 512.451.6579 Fax: 512.451.6678

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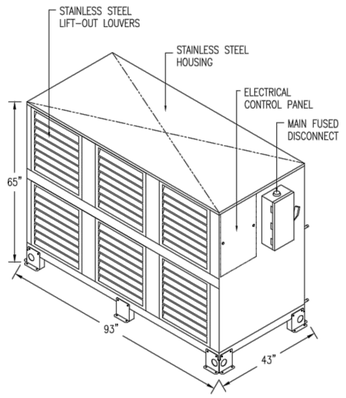
SHEET TITLE
KITCHEN FREEZER DETAILS

K104
SHEET

6/12/2017 8:39 AM

Bid 17105-186

MODEL NO. ZS2-6 OUTDOOR AIR COOLED REFRIGERATION SYSTEM



TO INCLUDE:
- CRANKCASE HEATERS
- HEADMASTER CONTROLS FOR ICE MACHINE CONDENSERS
- FAN CYCLING SWITCH
- OS4-05 OIL SEPARATOR FOR SYSTEM B
- TAMPER PROOF SCREWS PROVIDED ON RACK AND COILS

RACK WEIGHT: 1,655 LBS.

ENGINEERING SUMMARY

POWER SUPPLY: 208-230/60/3
CONNECTED LOAD: 55.5 AMPS

MAX FUSE SIZE: 70 AMPS
MINIMUM CIRCUIT AMPACITY: 62.0

SYSTEM	ITEM #	FIXTURES: DESCRIPTION	FIXTURES: TEMP FIXT.	FIXTURES: TEMP SUCT.	REFRIG.	REQD FIXT BTU	COMPRESSORS: MODEL NO.	H.P.	RATING @ 60 Hz: RLA	V	PH	BTU CAP. @ 110°F	TYPE	CONDENSER	EVAPORATOR COILS: MODEL NO.	QTY.	FAN MOTORS @ 60 Hz: RLA	V	PH	HEATERS @ 60 Hz: RLA	V	PH	DEFROST TYPE	TOTAL SYSTEM LOAD	DEFROST CLOCK	REFRIGERANT LINE SIZES: SUCT.	DIS.	LIQ.	LINE TYPE	ACCESSORIES: THERMOSTAT	VALVE	TXV
A	–	WALK-IN FREEZER	-10	-20	407A	18015	ZF25K4E	7.5	23.1	208	3	21200	Z		SME-090	2	1.5 EA	208	1	10.5 EA	208	1	ELEC	26.1	ECOSMART	1-3/8		1/2	M	F	F	F
AA	(MCO)	100% REDUNDANCY					ZF25K4E	7.5	23.1	208	3	21200	Z		–									–								
		CONDENSER FAN MOTOR							3.8	208	1			L5R										3.8								
B1	–	WALK-IN COOLER B	35			14058									SM-076	2	1.8 EA	115	1	–	–	–	O.C.		KE2TEMP	7/8		3/8	B	F	F	F
B2	–	WALK-IN COOLER C	35			18298									SM-090	2	1.8 EA	115	1	–	–	–	O.C.		KE2TEMP	7/8		3/8	B	F	F	F
B3	–	WALK-IN COOLER D	35			12285									SM-076	2	1.8 EA	115	1	–	–	–	O.C.		KE2TEMP	7/8		3/8	B	F	F	F
B		DIGITAL SCROLL COMP.		25	407A		ZBD45KCE	6.0	18.0	208	3	47400	Z											18.0		1-3/8		1/2	T			
BB	(MCO)	BACK-UP SCROLL COMP		25	A04A		ZB45KCE	6.0	18.0	208	3	47400	Z											–								
		CONDENSER FAN MOTOR							3.8	208	1			L7.5R										3.8								
C	–	ICE MACHINE CONDENSER	10	0	404A	*26400			1.9	208	1			L3R	BY OTHERS									1.9			5/8	3/8	C	O	O	O
D	–	ICE MACHINE CONDENSER	10	0	404A	*26400			1.9	208	1			L3R	BY OTHERS									1.9			5/8	3/8	C	O	O	O

*THR FREEZER EVAPORATOR COILS POWERED THROUGH RACK — COOLER EVAPORATOR COILS REQUIRE A HOUSE POWER SUPPLY

UL LISTED FINAL ASSEMBLY

NOTE:
IT IS THE INSTALLING CONTRACTORS RESPONSIBILITY TO FOLLOW ALL APPLICABLE CODES AND CURRENT REFRIGERATION INDUSTRY STANDARDS AND PRACTICES WHEN DETERMINING LINE SIZES, AND INSTALLING AND STARTING UP RDT EQUIPMENT.

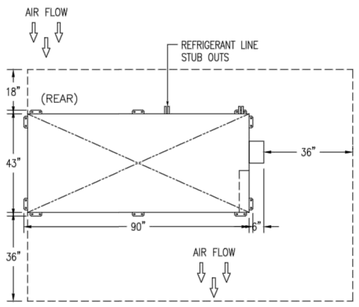
COMPRESSOR TYPE
S SEMI-HERMETIC
H HERMETIC
Z SCROLL

DEFROST TYPE
O.C. OFF CYCLE
ELEC ELECTRIC

EVAPORATOR ACCESSORIES
F FACTORY EQUIPPED
L LOOSE (FIELD INSTALLATION)
O PROVIDED BY OTHERS

LINE TYPE
T TRUNK LINE UP TO 100'
M MAIN LINE UP TO 100'
B BRANCH LINE UP TO 50'
C CONDENSER LINE UP TO 100'

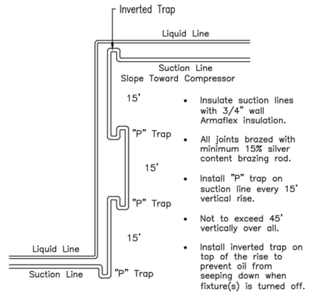
PLAN VIEW / CLEARANCE REQUIREMENTS



NOTE: MINIMUM CLEARANCE REQUIRED FOR PROPER OPERATION

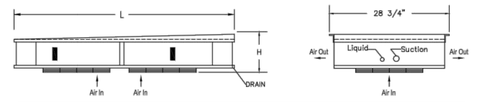
NOTE: ROOF CURB OR GROUND PAD CAN BE SAME SIZE AS OUTDOOR UNIT

SUCTION LINE VERTICAL RISE DETAIL



- Insulate suction lines with 3/4" wall Armaflex insulation.
- All joints brazed with minimum 15% silver content brazing rod.
- Install "P" trap on suction line every 15' vertical rise.
- Not to exceed 45' vertically over all.
- Install inverted trap on top of the rise to prevent oil from seeping down when fixture(s) is turned off.

EVAPORATOR DETAILS - MODEL SM & SME



SM Size	DIMENSIONS: L Inches	H Inches	Inlet (F.N.) In.	Suction OD In.	Approx. Net Wt. Lbs.	ELECTRICAL DATA: Qty. Motors	Fan Motor Amps 115/60/1	Fan Motor Amps 208-230/60/1
076	53-1/2	8-5/8	1/2	7/8	64	2	1.8	1.0
090	53-1/2	8-5/8	1/2	7/8	70	2	1.8	1.0

SME Size	DIMENSIONS: L Inches	H Inches	Inlet (F.N.) In.	Suction OD In.	Approx. Net Wt. Lbs.	ELECTRICAL DATA: Qty. Motors	Fan Motor Amps 208-230/60/1	Heater Amps 208-230/60/1
090	75-1/2	8-5/8	1/2	7/8	160	3	1.5	10.5

EVAPORATORS PROVIDED WITH EC MOTORS TO COMPLY WITH U.S. ENERGY INDEPENDENCE ACT OF 2007

APPROVAL STATUS

THIS DRAWING REPRESENTS OUR UNDERSTANDING OF THE SPECIFICATIONS. PLEASE REVIEW IT CAREFULLY FOR ACCURACY, CLEARLY AND IN DETAIL NOTE CHANGES REQUIRED.

MARK APPROPRIATE BOX, SIGN AND DATE BELOW.

- ☐ APPROVED FOR FABRICATION NO CHANGES
- ☐ APPROVED FOR FABRICATION WITH CHANGES NOTED
- ☐ REVISE AND RE-SUBMIT DRAWING

BY: _____

DATE: _____

NOTICE

THIS DRAWING BEING AN INSTRUMENT OF SERVICE IS AND WILL REMAIN PROPERTY OF REFRIGERATION DESIGN TECHNOLOGIES AND CANNOT BE USED WITHOUT WRITTEN AUTHORIZATION.

No.	Revision/Issue	Date
0	ORIGINAL ISSUE	1-16-14
1	REVISED PER UPDATED FLOOR PLAN	5-19-17

rdt
Refrigeration Design Technologies
Waxahachie, Texas
(800) 736-9518
www.rdtonline.com

Consultant:
-
-

Dealer:
-
-

Williamson County Jail
Georgetown, TX

Project: 16476

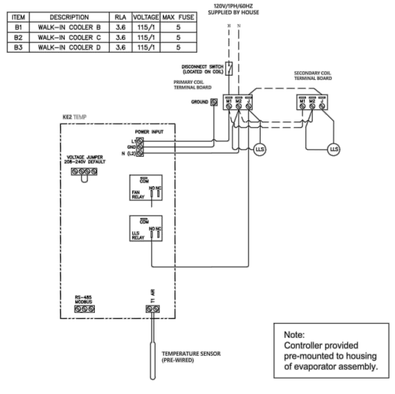
Sheet: 1.1 of sheets

Design by: J. Beam, Jr.

Drawn by: Z. Rieper

WIRING DIAGRAM - KE2TEMP
TIME-INITIATED, TIME TERMINATED CONTROLLER FOR WALK-IN COOLER
115/60/1

ITEM	DESCRIPTION	RLA	VOLTAGE	MAX FUSE
B1	WALK-IN COOLER B	3.6	115/1	5
B2	WALK-IN COOLER C	3.6	115/1	5
B3	WALK-IN COOLER D	3.6	115/1	5

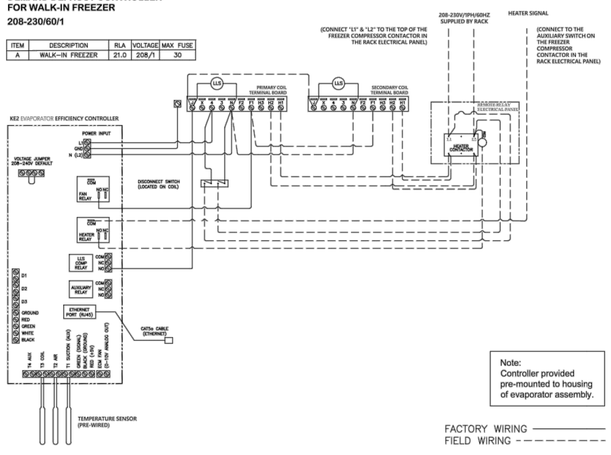


Note:
Controller provided pre-mounted to housing of evaporator assembly.

FACTORY WIRING ——
FIELD WIRING - - - -

WIRING DIAGRAM - ECO-SMART
DEMAND DEFROST CONTROLLER FOR WALK-IN FREEZER
208-230/60/1

ITEM	DESCRIPTION	RLA	VOLTAGE	MAX FUSE
A	WALK-IN FREEZER	21.0	208/1	30



Note:
Controller provided pre-mounted to housing of evaporator assembly.

FACTORY WIRING ——
FIELD WIRING - - - -

ZS SERIES ENGINEERING SPECIFICATIONS

Multi compressor, outdoor, air cooled. The refrigeration package shall be a pre-engineered and factory-assembled unit, trade name "ZS", as manufactured by Refrigeration Design Technologies, 1808 FM Road 66, P.O. Box 622, Waxahachie, Texas 75168. Phone: (972) 937-3215; Fax: (972) 937-0970.

1. Air-Cooled Refrigeration System
The RDT UL Listed "Air-Cooled" Refrigeration system shall be housed in a weather-protected compact galvanized steel frame. The entire housing shall be brushed stainless steel. The unit shall include an air-cooled aluminum fin copper tube condenser designed to operate at 15 degrees TD. The exterior housing shall feature stainless steel one piece louvers. Lifting points shall be integrated in the framing component. Condenser fan motors shall be mounted within the enclosure. The condenser intake surface shall be protected with stainless steel expanded metal guard to protect against vandalism and hail damage.

Each unit shall be equipped with a ball-bearing fan motor, suction filter, sight glass, liquid filter/drier, liquid line inlet and outlet valve, defrost cycle and high pressure super-hose connections. Each unit shall be equipped with fan cycling controls and/or head pressure regulator where required for low ambient conditions.

Condensing unit shall contain scroll, hermetic, semi-hermetic, and/or discus type compressor(s) assembled to operate with the refrigerant specified for both medium and low temperature applications.

2. Evaporator Coils
A. Evaporator coils shall be direct expansion type fabricated of copper tubes with aluminum fins.
B. All evaporator coils shall be provided with solenoid valve, thermostatic or electronic expansion valve and thermostat.

3. Pre-Piping
All refrigerant lines shall be extended to outside of the housing in a neat and orderly manner. All tubing shall be securely supported and anchored with non-corrosive coated clamps.

All joints must be brazed, not soldered.

All piping and controls shall be factory pressure-tested with dry nitrogen.

4. Control Panel
The package shall have a factory-mounted and pre-wired control panel, with main fused disconnect where required, circuit breakers, contactors wired for single point power connection.

General Information
Contractors shall verify all dimensions onsite and coordinate with other trades.

General contractor shall prepare the platform, curbed openings and weatherproofing the unit after installation.

Refrigeration Contractor
All copper tubing to be refrigerant grade. A.C.R. or type "L".

Brazing should be used for all refrigerant piping. Silver solder or soft solder is not acceptable.

All piping to be pressure tested with nitrogen at 300 psi. After the condensing unit and coil have been connected the balance of the system shall be leak tested with the valves open at 200 psi.

The complete system shall be evacuated with a vacuum pump. Each unit should be charged tested and adjusted to assure operation.

Contractor should provide and install the drain-line heater in freezer. Heater shall be connected by electrical contractor.

Electrical Contractor
Electrical contractor to provide power for refrigeration package and connect control and defrost system as called for in the wiring diagram.

Electrical contractor to connect drain-line heater in the freezer.

All electrical wiring and installation shall be in accordance with the wiring diagram and local codes.

Plumbing Contractor
Plumbing contractor to provide copper drain lines for walk-in refrigerator and freezer, pitched 1/4" per foot of run. Trap drain-line outside of refrigerated space to avoid entrance of warm, moist air.

All plumbing installation shall be in accordance with local codes.

1 LOW-TEMP REFRIGERATION REPLACEMENT
NOT TO SCALE

REFRIGERATION SYSTEM NOTE:

NEW COOLERS/FREEZER REFRIGERATION SYSTEM SHALL BE A 100% REDUNDANT SYSTEM.

ICE MACHINE NOTE:

ICE MACHINE WILL BE PROVIDED BY THE OWNER AND SHALL BE INSTALLED BY THE CONTRACTOR, SCOTSMAN MODEL C0330SA-1C. CONDENSING UNIT SHALL BE SEAMLESSLY COMPATIBLE WITH THE UNIT PROVIDED. CONTRACTOR SHALL PROVIDE CONDENSING UNIT, PIPING INSULATION AND CONTROL WIRING TO CONNECT TO OWNER PROVIDED, CONTRACTOR INSTALLED (OPCI) EQUIPMENT. PROVIDE ALL MATERIAL AND LABOR FOR START UP SERVICES OF OPCI EQUIPMENT.

CONTROLS NOTE:

CONNECT TEMPERATURE SENSORS AT ALL WALKING COOLERS / FREEZER TO THE EXISTING BUILDING MANAGEMENT SYSTEM (BMS). THE EXISTING BMS SYSTEM IS AN AUTOMATED LOGIC SYSTEM.

TALLEY
Talley Inc, engineers
6300 La Calma, Suite 100
Austin, Texas 78752
Texas Firm F-3271
Ph: 512.451.6579 Fax: 512.451.6678

STATE OF TEXAS — Thomas R. Alexander — 43239 — REGISTERED PROFESSIONAL ENGINEER

THE WALLACE GROUP, INC.
ENGINEERS
ARCHITECTS
PLANNERS
SURVEYORS
WACO, TEXAS

WILLIAMSON COUNTY JAIL RENOVATION
306 W. 4TH STREET
GEORGETOWN, TX 78626

MARK	DATE	DESCRIPTION
	5.22.17	CONSTRUCTION DOCS

PROJECT NO:
DRAWN BY: SR
DESIGNED BY: OV
CHECKED BY: TA

SHEET TITLE
MECHANICAL REFRIGERATION EQUIPMENT

K105
SHEET

Williamson County, Texas

6/1/2017 8:38 AM

AGREEMENT
BETWEEN OWNER AND CONTRACTOR

The **Owner**: Williamson County
710 Main Street, Ste. 101
Georgetown, Texas 78626

and **Contractor** _____
_____
_____ _____

for the **Project**: Williamson County Jail Kitchen and Plumbing Remodel
508 S. Rock Street
Georgetown, Texas 78628

Engineer/Architect: Talex, Inc.
6300 La Calma
Suite 100
Austin TX 78752

AGREEMENT, this Agreement Between Owner and Contractor (hereinafter called "Agreement") is entered into effective as of the date indicated herein below and all attachments (the "Effective Date"), by and between Williamson County a political subdivision of the State of Texas (hereinafter called the "Owner") and _____ (hereinafter called "Contractor").

WHEREAS, the Owner desires to retain a Contractor for the Williamson County Jail Kitchen and Plumbing Remodel (hereinafter called the "Project"),

WHEREAS, the Owner desires a Contractor who will render, diligently and competently in accordance with the highest standards used in the profession, all Contractor services which shall be necessary or advisable for the expeditious, economical and satisfactory completion of the Project, and

NOW, THEREFORE, in consideration of the mutual undertakings herein contained, the parties hereto agree as follows:

ARTICLE 1 SCOPE OF WORK

The Contractor has overall responsibility for and shall provide complete construction services and furnish all materials, equipment, tools and labor as necessary or reasonably inferable to complete the Work, or any phase of the Work, in accordance with the Specifications and Drawings for the Project and the Owner's requirements. The Specifications and Drawings were prepared for Williamson County by the Engineer. The Contractor shall do everything required by the Contract Documents.

ARTICLE 2 CONTRACT DOCUMENTS

2.1 The Contract Documents consist of the following, which are incorporated by reference for all purposes:

a. This Agreement and all exhibits and attachments listed, contained or referenced in this Agreement;
b. The Uniform General Conditions for Williamson County ("General Conditions");
c. The Supplementary or Special Conditions, if any;
d. All Addenda issued prior to the Effective Date of this Agreement;
e. The Bid/Proposal Documents as defined by the Invitation for Bidders/Request for Proposals;
f. All Change Orders issued after the Effective Date of this Agreement;
g. Minimum Insurance Coverages and Minimum Coverage Amounts, which is attached here to as **Exhibit 1**; and
h. The Drawings, Specifications, details and other documents developed by Engineer to describe the Project and accepted by Owner, which are attached hereto **Exhibit 2**.

2.2 The Contract Documents form the entire and integrated Contract and Agreement between Owner and Contractor and supersede all prior negotiations, representations or agreements, written or oral. Contractor acknowledges receipt of all Contract Documents as of the date of its execution hereof.

2.3 The term "Contractor" shall be interchangeable with the terms "Proposer," "Bidder," Respondent" and "General Contractor" or other similar terms as appropriate in the Contract Documents.

ARTICLE 3 CONTRACT TIME

Contractor acknowledges this Project includes very unique circumstances and factors due to the fact the Work being performed is on a jail facility which contains a jail kitchen that services the Williamson County Jail inmate population. Owner has contracted with a third party to provide off-site meal preparation and delivery

services to inmates of the Williamson County Jail during complete shut-down and construction of the jail kitchen remodel portion of the Project (construction of the jail kitchen remodel portion of the Project shall be referred to as the "Jail Kitchen Remodel Work" for purposes of Articles 3 & 6).

The rate for the above referenced offsite meal preparation and delivery services is substantially higher than the rate currently charged for food preparation at the Williamson County jail kitchen facility. The Owner cannot determine the total increased offsite meal costs at the time of contracting hereunder due to the daily change in jail inmate population. The Owner agrees to bear the additional costs associated with the offsite meal preparation and delivery for up to one hundred twenty (120) calendar days in order to allow for the Jail Kitchen Remodel Work to be substantially completed and operational for preparation of all meals for the jail inmates. Following the said one hundred twenty (120) calendar day time period, liquidated damages will be assessed against Contractor and deducted from any money due or that becomes due the Contractor in accordance with Article 6 below.

In addition to the Jail Kitchen Remodel Work, Contractor will perform other Work on the Project that is unrelated, separate and apart from the Jail Kitchen Remodel Work (such other Work is referred to collectively as "Other Jail Work" for purposes of Articles 3 & 6). Portions of the Other Jail Work may be performed prior to, during and after the one hundred twenty (120) calendar day time frame allowed for the Jail Kitchen Remodel Work. The Other Jail Work is fully described in the Drawings, Specifications, details and other documents attached hereto as Exhibit 2. The Other Jail Work includes, but is not be limited to the following:

1. **procurement of necessary equipment and materials;**
2. **epoxy pipe system rehabilitation;**
3. **HVAC system in the south basement area**
4. **fire stopping installation;**
5. **HVAC equipment pads; and**
6. **new equipment installation that is not associated with the jail kitchen.**

The Owner will issue two (2) separate Notices to Proceed. One Notice to Proceed will be issued for only the Work relating to the Jail Kitchen Remodel Work portion of the Project. The other Notice to Proceed will be issued by the Owner for the Other Jail Work portion of the Project.

As set out in this article and under Article 6 below, the Contractor must substantially complete the Jail Kitchen Remodel Work referenced above within one hundred twenty (120) calendar days of Owner's Notice to Proceed so that the jail kitchen is in a fully operable condition and able to serve the inmate population at the conclusion of the one hundred twenty (120) calendar day time period. A separate substantial completion date or time period will be applicable to the Other Jail Work, as set out herein below.

3.1 Contract Time for Jail Kitchen Remodel Work. The Owner shall provide a separate Notice to Proceed in which a date for commencement of the work for the Jail Kitchen Remodel Work shall be started. The Contractor shall achieve Substantial Completion of the Jail Kitchen Remodel Work within one hundred twenty (120) calendar days from the commencement date set out in Owner's Notice to Proceed with the Jail Kitchen Remodel Work, as such completion date may be extended by approved Change Orders. Unless otherwise specified in writing, Contractor shall achieve Final Completion for the Jail Kitchen Remodel Work within thirty (30) calendar days of the date for Substantial Completion. The time set forth for completion of the Jail Kitchen Remodel Work is an essential element of the Contract.

3.2 Contract Time for Other Jail Work. The Owner shall provide a separate Notice to Proceed in which a date for commencement of the Other Jail Work shall be started. The Contractor shall achieve Substantial Completion of the Other Jail Work within (TO BE NEGOTIATED PRIOR TO AWARD) calendar days from the commencement date set out in Owner's Notice to Proceed with the Other Jail Work, as such completion date may be extended by approved Change Orders. Unless otherwise specified in writing, Contractor shall achieve Final Completion for the Other Jail Work within (TO BE NEGOTIATED PRIOR TO AWARD) calendar days of the date for Substantial Completion. The time set forth for completion of the Other Jail Work is an essential element of the Contract.

ARTICLE 4 CONTRACTOR REPRESENTATIONS

4.1 In order to induce Owner to enter into this Agreement, Contractor has made representations throughout this Agreement and hereby further makes the following representations:

A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bid/Proposal Documents.

B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work. Furthermore, Contractor acknowledges this Project includes very unique circumstances and factors due to the fact the Work being performed is on a jail facility that contains a jail kitchen that services the Williamson County Jail inmate population, that must remain operable, and that security measures must be taken and followed during all Work on the Project.

C. Contractor is familiar with and is satisfied as to all federal, state, and local laws and regulations that may affect cost, progress, and performance of the Work.

D. Contractor has considered the information known to Contractor; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents; and (3) Contractor's safety precautions and programs.

E. Based on the information and observations referred to in Paragraph 4.1.D above, Contractor does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

F. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

G. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

H. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

ARTICLE 5 THE CONTRACT PRICE; OWNER'S CONSTRUCTION CONTINGENCY

5.1 Contract Price. Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents the amount of **$**_____

5.2 Contract Payments. Method and terms of payment of the Contract Price shall be in accordance with the Contract Documents.

5.3 Owner's Construction Contingency. The following lump sum amount shall serve as the Owner's Construction Contingency from which changes in the Work are to be paid in accordance with the General Conditions:

$_____

The Owner's Construction Contingency is controlled solely by the Owner. Expenditures from the Owner's Construction Contingency must be made by Change Order issued by the Architect and approved by the Owner in accordance with the General Conditions. Contractor shall not be entitled to any compensation from the any unused amounts of the Owner's Construction Contingency.

ARTICLE 6 TIME

6.1 TIME LIMITS STATED IN THE CONTRACT DOCUMENTS ARE OF THE ESSENCE OF THIS AGREEMENT.

6.2 Unless otherwise approved in writing, the Owner and the Contractor shall perform their respective obligations under the Contract Documents as expeditiously as is consistent with reasonable skill and care and the orderly progress of the Work.

6.3 Liquidated Damages for Jail Kitchen Remodel Work. As set out herein above, this Project includes very unique circumstances and factors due to the fact that the Work being performed is on a jail facility which contains a jail kitchen that services the Williamson County Jail inmate population. Contractor and Owner recognize that time is of the essence and that Owner will suffer additional financial loss **if the Jail Kitchen Remodel Work is not completed within one hundred twenty (120) calendar days from the commencement date set out in Owner's Notice to Proceed with the Jail Kitchen Remodel Work, plus any extensions thereof allowed by Owner**. The parties also recognize the uniqueness of the facility being a jail that houses an inmate population that changes daily and the delays, expense, and difficulties involved in proving in a legal proceeding the actual loss suffered by Owner if the Jail Kitchen Remodel Work portion of the Project is not completed within the said one hundred twenty (120) calendar day time period. Accordingly, instead of requiring any such proof, for each consecutive calendar day after the said one hundred twenty (120) calendar day time period that the Jail Kitchen Remodel Work portion of the Project is not substantially completed, the Owner may deduct for each consecutive calendar day after the date of Substantial Completion that the Work on the Jail Kitchen Remodel Work portion of the Project is not substantially completed, the Owner may deduct the amount of:

One Thousand Seven Hundred Fifty Dollars per calendar day ($1,750.00/calendar day)

from any money due or that becomes due the Contractor, not as a penalty but as liquidated damages representing the parties' estimate at the time of contract execution of the damages that the Owner will sustain for late completion of the Jail Kitchen Remodel Work portion of the Project. The parties stipulate and agree that calculating Owner's actual damages for late completion of the Jail Kitchen Remodel Work portion of the Project would be impractical, unduly burdensome, and cause unnecessary delay and that the amounts of daily liquidated damages set forth are reasonable due to the unique

circumstances of the jail facility. Contractor expressly agrees that the amounts of daily liquidated damages for the Jail Kitchen Remodel Work portion of the Project are a reasonable forecast of the actual damages Owner will incur due to any such delay.

6.4 Liquidated Damages for Other Jail Work. Contractor and Owner recognize that time is of the essence and that Owner will suffer financial loss if the Other Jail Work portion of the Project is not completed within the times specified in Article 3 above, plus any extensions thereof allowed by the Owner. The parties also recognize the delays, expense, and difficulties involved in proving in a legal proceeding the actual loss suffered by Owner if the Other Jail Work portion of the Project is not completed on time. Accordingly, instead of requiring any such proof, for each consecutive calendar day after the date of Substantial Completion that the Other Jail Work portion of the Project is not substantially completed, the Owner may deduct the amount of:

Five Hundred Dollars per calendar day ($500.00/calendar day)

from any money due or that becomes due the Contractor, not as a penalty but as liquidated damages representing the parties' estimate at the time of contract execution of the damages that the Owner will sustain for late completion of the Other Jail Work portion of the Project. The parties stipulate and agree that calculating Owner's actual damages for late completion of the Other Jail Work portion of the Project would be impractical, unduly burdensome, and cause unnecessary delay and that the amounts of daily liquidated damages set forth are reasonable. Contractor expressly agrees that the amounts of daily liquidated damages for the Other Jail Work portion of the Project are a reasonable forecast of the actual damages Owner will incur due to any such delay.

ARTICLE 7 NOTICES

Notices of claims, disputes or other legal notices shall be in writing and shall be deemed to have been given when delivered in person to the representative of the Contractor or Owner for whom it is intended, as set out below or sent by U. S. Mail to the representative of the Contractor or Owner for whom it is intended, as set out below. Mail notices are deemed effective upon receipt or on the third business day after the date of mailing, whichever is sooner.

If to Owner:
Williamson County Judge
710 Main Street, Ste. 101
Georgetown, Texas 78626

with copy to:
Hal C. Hawes
General Counsel to the
Williamson County Commissioners Court
710 Main Street, Suite 102
Georgetown, Texas 78626

If to Contractor: _____
_____
_____ _____

The parties may make reasonable changes in the person or place designated for receipt of notices upon advance written notice to the other party.

ARTICLE 8 PARTY REPRESENTATIVES

The Owner's Designated Representative (sometimes referred to as the "ODR") authorized to act in the Owner's behalf with respect to the Project is:

Dale Butler
Assistant Director, Projects
Williamson County Facilities
3101 SE Inner Loop
Georgetown, TX 78626
Phone: 512-943-1609

The Contractor's designated representative authorized to act on the Contractor's behalf and bind the Contractor with respect to the Project is:

_____
_____
_____ _____
Phone (512) _____
Fax (512) _____

The parties may make reasonable changes in their designated representatives upon advance written notice to the other party.

ARTICLE 9 ENTIRE AGREEMENT

This Agreement supersedes all prior agreements, written or oral, between Contractor and Owner and shall constitute the entire agreement and understanding between the parties with respect to the Project. This Agreement and the terms of the Contact Documents shall be binding upon the parties and may not be waived, modified, amended or altered except by a writing signed by Contractor and Owner.

BY SIGNING BELOW, the Parties have executed and bound themselves to this Agreement to be effective as of the date of the last party's execution below (the "Effective Date").

WILLIAMSON COUNTY Williamson County, Texas,	_____, a Texas _____,
By: _____	By: _____
Printed Name: _____	Printed Name: _____
Title: _____	Title: _____
Date: _____ ____, 20____	Date: _____ ____, 20____

EXHIBIT 1

Minimum Insurance Coverages

Minimum Coverage Amounts

A. All policies of insurance provided by the Contractor must comply with the requirements of this Exhibit, the Contract Documents and the laws of the State of Texas.

B. The Contractor shall provide and maintain, until the Work covered in the Agreement Between Owner and Contractor is completed and accepted by the Owner, the minimum insurance coverages in the minimum amounts as described below. Coverage shall be written on an occurrence basis by companies authorized and admitted to do business in the State of Texas and rated A- or better by A.M. Best Company, or otherwise acceptable to Owner.

	Type of Coverage	Limits of Liability
1.	Worker's Compensation	Statutory
2.	Employer's Liability	
	Bodily Injury by Accident	$500,000 Ea. Accident
	Bodily Injury by Disease	$500,000 Ea. Employee
	Bodily Injury by Disease	$500,000 Policy Limit

3. Comprehensive general liability including completed operations and contractual liability insurance for bodily injury, death, or property damages in the following amounts:

COVERAGE	PER OCCURRENCE
Comprehensive General Liability (including premises, completed operations and contractual)	$1,000,000
Aggregate policy limits:	$2,000,000

4. Comprehensive automobile and auto liability insurance (covering owned, hired, leased and non-owned vehicles):

COVERAGE	PER PERSON	PER OCCURRENCE
Bodily injury (including death)	$1,000,000	$1,000,000

Property damage	$1,000,000	$1,000,000
Aggregate policy limits	No aggregate limit	

5. Builder's Risk Insurance (all risks)
An all risk policy, in the amount equal at all times to 100% of the Contract Price or Contract Sum. The policy shall be issued in the name of the Contractor and shall name its Subcontractors as additional insureds. The Owner shall be named as a loss payee on the policy. The builders risk policy shall have endorsements as follow:

a. This insurance shall be specific as to coverage and not considered as contributing insurance with any permanent insurance maintained on the present premises. If off-site storage is permitted, coverage shall include transit and storage in an amount sufficient to protect property being transported or stored.

b. This insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, caused by certified acts of terrorism as defined in the Terrorism Risk Insurance Act, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss as well as coverage for building materials while in transit or building materials suitably stored at a temporary location. Property insurance provided by the Contractor shall not cover any tools, apparatus, machinery, scaffolding, hoists, forms, staging, shoring, and other similar items commonly referred to as construction equipment that may be on the site and the capital value of which is not included in the Work. The Contractor shall make its own arrangements for any insurance it may require on such construction equipment. Any such policy obtained by the Contractor under this section shall include a waiver of subrogation in accordance with the requirements of Section 11.3.4 of the General Conditions.

C. For renovation projects and or portions of work contained within an existing structure, the Owner waives subrogation for damage by fire to existing building structure(s), if the Builder's Risk Policy has been endorsed to include coverage for existing building structure(s) in the amount described in the Special Conditions. However, Contractor shall not be required to obtain such an endorsement unless specifically required by the

Special Conditions in the Contract Documents. The aforementioned waiver of subrogation shall not be effective unless such endorsement is obtained.

6. Flood insurance when specified in Supplementary General Conditions or Special Conditions.

7. Umbrella coverage in the amount of not less than $5,000,000.

C. Workers' Compensation Insurance Coverage:

a. Definitions:

(1) Certificate of coverage ("certificate") - A copy of a certificate of insurance, a certificate of authority to self-insure issued by the Texas Workers' Compensation Commission, or a coverage agreement (TWCC-81, TWCC-82, TWCC-83, or TWCC-84), showing statutory workers' compensation insurance coverage for the person's or entity's employees providing services on a project, for the duration of the Project.
(2) Duration of the Project - includes the time from the beginning of the work on the Project until the Contractor's/person's work on the Project has been completed and accepted by the Owner.
(3) Coverage – Workers' compensation insurance meeting the statutory requirements of the Texas Labor Code, §401.011(44).
(4) Persons providing services on the Project ("subcontractor") - includes all persons or entities performing all or part of the services the Contractor has undertaken to perform on the Project, regardless of whether that person contracted directly with the Contractor and regardless of whether that person has employees. This includes, without limitation, independent contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity, or employees of any entity which furnishes persons to provide services on the Project. "Services" include, without limitation, providing, hauling, or delivering equipment or materials, or providing labor, transportation, or other service related to a project. "Services" does not include activities unrelated to the Project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets.

b. The Contractor shall provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, §401.011(44) for all employees of the Contractor providing services on the Project, for the duration of the Project.
c. The Contractor must provide a certificate of coverage prior to execution of the Agreement Between Owner and Contractor, and in no event later than ten (10)

days from Notice of Award. Failure to provide the insurance in a timely fashion may result in loss of Contractor's bid bond.

d. If the coverage period shown on the Contractor's current certificate of coverage ends during the duration of the Project, the Contractor must, prior to the end of the coverage period, file a new certificate of coverage with the Owner showing that coverage has been extended.
e. The Contractor shall obtain from each person providing services on a project, and provide to the Owner:

(1) a certificate of coverage, prior to that person beginning work on the Project, so the Owner will have on file certificates of coverage showing coverage for all persons providing services on the Project; and
(2) no later than seven days after receipt by the Contractor, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the Project.

f. The Contractor shall retain all required certificates of coverage for the duration of the Project and for one year thereafter.
g. The Contractor shall notify the Owner in writing by certified mail or personal delivery, within 10 days after the Contractor knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the Project.
h. The Contractor shall post on each project site a notice, in the text, form and manner prescribed by the Texas Workers' Compensation Commission, informing all persons providing services on the Project that they are required to be covered, and stating how a person may verify coverage and report lack of coverage.

i. The Contractor shall contractually require each person with who it contracts to provide services on a project, to:

(1) provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas labor Code, Section 401.011(44) for all of its employees providing services on the Project, for the duration of the Project;
(2) provide to the Contractor, prior to that person beginning work on the Project, a certificate of coverage showing that coverage is being provided for all employees of the person providing services on the Project, for the duration of the Project;
(3) provide the Contractor, prior to the end of the coverage period, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the Project;

(4) obtain from each other person with whom it contracts, and provide to the Contractor:

a. a certificate of coverage, prior to the other person beginning work on the Project; and
b. a new certificate of coverage showing extension of coverage, prior to the end of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the Project;

(5) retain all required certificate of coverage on file for the duration of the Project and for one year thereafter;
(6) notify the Owner in writing by certified mail or personal delivery, within 10 days after the person knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the Project; and
(7) contractually require each person with whom it contracts, to perform as required by paragraphs (1)-(7), with the certificates of coverage to be provided to the person for whom they are providing services.

j. By signing the Agreement Between Owner and Contractor or providing or causing to be provided a certificate of coverage, the Contractor is representing to the Owner that all employees of the Contractor who will provide services on the Project will be covered by workers' compensation coverage for the duration of the Project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self-insured, with the commission's Division of Self-Insurance Regulation. Providing false or misleading information may subject the Contractor to administrative penalties, criminal penalties, civil penalties, or other civil actions.
k. The Contractor's failure to comply with any of these provisions is a breach of contract by the Contractor which entitles the Owner to declare the Agreement Between Owner and Contractor void if the Contractor does not remedy the breach within ten days after receipt of notice of breach from the Owner.

D. If insurance policies are not written for the amounts specified in this Exhibit, Contractor shall carry Umbrella or Excess Liability Insurance for any differences in amounts specified. If Excess Liability Insurance is provided, it shall follow the form of primary coverage.

E. The furnishing of the above listed insurance coverage, as may be modified by the Contract Documents, must be tendered prior to execution of the Agreement Between Owner and Contractor, and in no event later than ten (10) days from Notice of Award. Failure to provide the insurance in a timely fashion may result in loss of Contractor’s bid bond.

F. Owner shall be entitled, upon request and without expense, to receive copies of the policies and all endorsements as they apply to the limits set out in this Exhibit.

G. Contractor shall be responsible for payment of premiums for all of the insurance coverages required under this Exhibit. Contractor further agrees that for each claim, suit or action made against insurance provided hereunder, with respect to all matters for which the Contractor is responsible hereunder, Contractor shall be solely responsible for all deductibles and self-insured retentions. Any deductibles or self-insured retentions over **$75,000** in the Contractor's insurance must be declared and approved in writing by Owner in advance.

EXHIBIT 2 –DRAWINGS AND SPECIFICATIONS

FOR
WILLIAMSON COUNTY JAIL KITCHEN AND PLUMBING REMODEL

UNIFORM GENERAL CONDITIONS
FOR WILLIAMSON COUNTY

TABLE OF ARTICLES

1 GENERAL PROVISIONS
2 OWNER
3 CONTRACTOR
4 ARCHITECT
5 SUBCONTRACTORS
6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
7 CHANGES IN THE WORK
8 TIME
9 PAYMENTS AND COMPLETION
10 PROTECTION OF PERSONS AND PROPERTY
11 INSURANCE AND BONDS
12 UNCOVERING AND CORRECTION OF WORK
13 MISCELLANEOUS PROVISIONS
14 TERMINATION OR SUSPENSION OF THE CONTRACT
15 CLAIMS AND DISPUTES

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract as revised, Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Owner or the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

§ 1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor.

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

§ 1.1.4 THE PROJECT
The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

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

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

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

§ 1.1.8 KNOWLEDGE: The terms "knowledge," "recognize," and "discover," their respective derivatives, and similar terms in the Contract Documents, as used in reference to the Contractor, shall be interpreted to mean that which the Contractor knows (or should know), recognizes (or should recognize), and discovers (or should discover) in exercising the care, skill, and diligence required by the Contract Documents. Analogously, the expression "reasonably inferable" and similar terms in the Contract Documents shall be interpreted to mean reasonably inferable by a contractor familiar with the Project and exercising the care, skill, and diligence required of the Contractor by the Contract Documents.§1.1.10 PRODUCT: Materials, systems, and equipment incorporated or to be incorporated in the Work.

§1.1.9 PROVIDE: Furnish and install and shall include, without limitation, labor, materials, equipment, transportation, services and other items required to complete the referenced tasks.

§1.1.02 FURNISH: Pay for, deliver (or receive), unload, inspect, and store products, materials, equipment, and accessories as specified while retaining care, custody and control until received for installation based on a signed receipt.

§ 1.1.11 INSTALL: Receive, unload, inspect, and store as specified while retaining care, custody and control; set or place in position, make required connections; and adjust and test as specified in the Contract Documents for satisfactory performance and operation.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS
§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the intended results. In the event of inconsistencies within or between parts of the Contract Documents, or between the Contract Documents and applicable standards, codes, and ordinances, the Contractor shall (i) provide the better quality or greater quantity of Work or (ii) comply with the more stringent requirement; either or both in accordance with the Owner or the Architect’s

interpretation. The terms and conditions of this Section 1.2.1, however, shall not relieve the Contractor of any of the obligations set forth in the Contract Documents.

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

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

§ 1.2.3.1 Whenever a product is specified in accordance with a Federal Specification, an ASTM Standard, an American National Standards Institute Specification, or other Association Standard, the Contractor, if required by the Specifications or if requested by the Owner, shall present evidence from the manufacture, certifying the product complies with the particular Standard or Specification. When required by the Contract Documents, supporting data shall be submitted to substantiate compliance.

§ 1.2.3.2 Whenever a product is specified or shown by describing proprietary items, model numbers, catalog numbers, manufacturer, trade names, or similar reference, no substitutions may be made unless accepted in strict accordance with the Substitution requirements stated in the Specifications or, if no Substitution requirements are stated in the Specifications, in accordance with the requirements stated elsewhere in the Contract Documents. Where two or more products are shown or specified, the Contractor has the option to use either of those shown or specified.

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

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

§ 1.5 USE OF DRAWINGS AND OTHER INSTRUMENTS OF SERVICE
§ 1.5.1 The Architect and the Architect’s consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights, except as provided in the Owner-Architect Agreement. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect’s or Architect’s consultants’ reserved rights.

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

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM
If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall establish the necessary protocols governing such transmissions in writing, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER

§ 2.1 GENERAL

The Owner means Williamson County acting through any duly authorized representative as provided in the Agreement, and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization ("Owner's Designated Representative"). The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.2 OWNER

§ 2.2.1 Appropriation of Funds by Owner. Owner believes it has sufficient funds currently available and authorized for expenditure to finance the costs of the Agreement between Owner and Contractor. Contractor understands and agrees that the Owner's payment of amounts under the Agreement between Owner and Contractor is contingent on the Owner receiving appropriations or other expenditure authority sufficient to allow the Owner, in the exercise of reasonable administrative discretion, to continue to make payments under the Agreement.

§ 2.2.2 Unless specifically stated otherwise in the Contract Documents, Contractor shall secure and pay for necessary permits, approvals, assessments, and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. Except for surveys or grade information, the Contractor shall compare the information furnished by the Owner, including, but not limited to, soil tests, with visibly observable physical conditions and the Contract Documents and, on the basis of such review, promptly report to the Owner and the Architect any known conflicts, errors or omissions. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

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

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

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

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

§2.5 EXTENT OF OWNER RIGHTS

§ 2.5.1 The rights stated in this Article 2 and elsewhere in the Contract Documents are cumulative and not in limitation of any rights of the Owner (i) granted in the Contract Documents, (ii) at law, or (iii) in equity.

§ 2.5.2 In no event shall the Owner have control over, charge of, or any responsibility for construction means, methods, techniques, sequences, or procedures or for safety precautions and programs in connection with the Work, notwithstanding any of the rights and authority granted the Owner in the Contract Documents.

§ 2.6 OWNER'S RIGHT TO RECORDS

§ 2.6.1 The Contractor's records, which shall include but not be limited to accounting records, written policies and procedures, subcontractor files (including proposals of successful bidders), original estimates, estimating work sheets, correspondence, schedules, change order files (including documentation covering negotiated settlements), and any other supporting evidence necessary to substantiate charges related to this contract (all foregoing hereinafter referred to as "records") and shall be open to inspection and subject to audit and/or reproduction, during normal working hours, by Owner's agent or its authorized representative to the extent necessary to adequately permit evaluation and verification of any invoices, payments or claims submitted by the Contractor or any of his payees. Such records subject to examination shall also include, but not be limited to, those records necessary to evaluate and verify direct and indirect costs (including overhead allocations) as they may apply to costs associated with this Contract.

§ 2.6.2 For the purpose of such audits, inspections, examinations and evaluations, the Owner's agent, or authorized representatives shall have access to said records from the effective date of this Contract for the duration of Work and until three (3) years (or longer if required by law) after the date of final payment by Owner to Contractor.

§ 2.6.3 Owner's agent or its authorized representative shall have access during normal business hours to the Contractor's facilities, shall have access to all necessary records and shall be provided adequate and appropriate work space, in order to conduct audits in compliance with this Article 2.6. Owner's agent or authorized representative shall give auditees reasonable advance notice of intended audits.

§ 2.6.4 Contractor shall require all subcontractors, insurance agents, and material suppliers (payees) with cost plus contracts, if permitted, and not fixed price contracts to comply with the provisions of this Article by insertion of the requirements hereof in a written contract agreement between Contractor and payee. Failure to obtain such written contracts which include such provisions shall be reason to exclude some or all of the related payee's costs from amounts payable to the Contractor pursuant to this contract.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative, and if these General Conditions are used in conjunction with the Agreement between Owner and Construction Manager-At-Risk, the term "Contractor" shall mean the Construction Manager.

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

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

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents. Prior to execution of the Agreement, the Contractor and each Subcontractor shall have evaluated and satisfied themselves as to the observable conditions and limitations under which the Work is to be performed, including, without limitation, (i) the location, condition, layout, and nature of the Project site and surrounding areas, (ii) generally prevailing climatic conditions, (iii) anticipated labor supply and costs, (iv) availability and cost of materials, tools, and equipment, and (v) other similar issues. The Owner assumes no responsibility or liability for the physical condition or safety of the Project site or any improvements located on the Project site. Except as set forth in Section 10.3, the Contractor shall be solely responsible for providing a safe place for the performance of the Work. The Owner shall not be required to make any adjustment in either the Contract Sum or the Contract Time in connection with any failure by the Contractor or any Subcontractor to have complied with the requirements of this Section 3.2.1.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Owner and Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner. The Contractor shall verify the accuracy of elevations, dimensions, locations, and field measurements. In all cases of the interconnection of its Work with existing or other Work, the Contractor shall verify at the site all dimensions relating to such existing or other Work.

.1 All of Contractor's work shall conform to the Contract Documents. Contractor shall be responsible for the details of the Work necessary to carry out the intent of the drawings and specifications, or which are customarily performed. When more detailed information is required for performance of the Work or when an interpretation of the Contract Documents is requested, the Contractor shall submit a written request for information to the Architect or Owner (as required), and the Owner or Architect shall furnish such information or interpretation. Where only part of the Work is indicated, similar parts shall be considered repetitive. Where any detail is shown and components thereof are fully described, similar details not fully described shall be considered to incorporate the fully described details and components.

.2 The Contractor has had an opportunity to examine, and has carefully examined, all of the Contract Documents and Project site, and has fully acquainted itself with the scope of work, design, availability of materials, existing facilities, access, general topography, soil structure, subsurface conditions, obstructions, and all other conditions pertaining to the Work, the site of the Work, and its surrounding; that it has made necessary investigations to a full understanding of the difficulties which may be encountered in performing the Work; and that anything in any Contract Documents, or in any representations, statements, or information made or furnished by Owner or its representatives notwithstanding, Contractor will complete the Work for the compensation stated in the Agreement. In addition thereto, Contractor represents that it is fully qualified to do the Work in accordance with the terms of this Agreement in the time specified.

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

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

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

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

§ 3.3.4 Inspection of the progress, quantity, or quality of the Work done by the Owner, any Owner's representative, any governmental agency, or the Architect, or any inspector, shall not relieve the Contractor of any responsibility for the compliance of the Work with the Contract Documents. The Owner or its approved representative (heretofore referred to as Owner's representative) shall have access to the worksite and all Work. No supervision or inspection by the Owner's representative, nor the authority to act nor any other actions taken by the Owner's representative shall relieve the Contractor of any of its obligations under the Contract Documents nor give rise to any duty on the part of the Owner.

§ 3.4 LABOR AND MATERIALS

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

§ 3.4.1.1 Duty to Pay Prevailing Wage Rates. The Contractor shall pay not less than the wage scale of the various classes of labor as shown on the "Prevailing Wage Schedule" provided by the Owner. The specified wage rates are minimum rates only, and are not representations that qualified labor adequate to perform the Work is available locally at the prevailing wage rates. The Owner is not bound to pay—and will not consider—any claims for additional compensation made by any Contractor because the Contractor pays wages in excess of the applicable minimum rate contained in the Contract Documents. The "Prevailing Wage Schedule" is not a representation that quantities of qualified labor adequate to perform the Work may be found locally at the specified wage rates.

.1 For classifications not shown, workers shall not be paid less than the wage indicated for Laborers. The Contractor shall notify each worker commencing work on the Project the worker's job classification and the established minimum wage rate required to be paid, as well as the actual amount being paid. The notice must be delivered to and signed in acknowledgement of receipt by the employee and must list both the monetary wages and fringe benefits to be paid or furnished for each classification in which the worker is assigned duties. When requested by Owner, competent evidence of compliance with the Texas Prevailing Wage Law shall be furnished by Contractor.

.2 A copy of each worker wage rate notification shall be submitted to the Owner with the Application for Payment for the period during which the worker began on-site activities.

§ 3.4.1.2 Prevailing Wage Schedule. The "Prevailing Wage Schedule" shall be determined by the Owner in compliance with Chapter 2258, Texas Government Code. Should the Contractor at any time become aware that a particular skill or trade not reflected on the Owner's Prevailing Wage Schedule will be or is being employed in the Work, whether by the Contractor or by a subcontractor, the Contractor shall promptly inform the Owner and shall specify a wage rate for that skill or trade, which shall bind the Contractor.

§ 3.4.1.3 Penalty for Violation. The Contractor and any Subcontractor shall pay to the Owner a penalty of sixty dollars ($60.00) for each worker employed for each calendar day, or portion thereof, that the worker is paid less than the wage rates stipulated in the Prevailing Wage Schedule or any supplement thereto pursuant to §3.4.1.2. The Contractor and each Subcontractor shall keep, or cause to be kept, an accurate record showing the names and occupations of all workers employed in connection with the Work, and showing the actual per diem wages paid to each worker, which records shall be open at all reasonable hours for the inspection by the Owner.

§ 3.4.1.4 Complaints of Violations of Prevailing Wage Rates. Within 31 days of receipt of information concerning a violation of Chapter 2258 of the Texas Government Code, the Owner shall make an initial determination as to whether good cause exists to believe a violation occurred. The Owner's decision on the initial determination shall be reduced to writing and sent to the Contractor or Subcontractor against whom the violation was alleged, and to the affected worker. When a good cause finding is made, the Owner shall retain the full amounts claimed by the claimant or claimants as the difference between wages paid and wages due under the Prevailing Wage Schedule and any supplements thereto, together with the applicable penalties, such amounts being subtracted from successive progress payments pending a final decision on the violation.

§ 3.4.1.5 Arbitration Required if Violation not Resolved. After the Owner makes its initial determination, the affected Contractor or Subcontractor and worker have 14 days in which to resolve the issue of whether a violation occurred, including the amount that should be retained by Owner or paid to the affected worker. If the Contractor or Subcontractor and affected worker reach an agreement concerning the worker's claim, the Contractor shall promptly notify the Owner in a written document signed by the worker. It the Contractor or Subcontractor and affected worker do not agree before the 15th day after the Owner's determination, the Contractor or Subcontractor and affected worker must participate in binding arbitration in accordance with the Texas General Arbitration Act, Chapter 171, Tex. Civ. Prac. & Rem. Code. The parties to the arbitration have 10 days after the expiration of the 15 days referred to above, to agree on an arbitrator; if by the 11th day there is no agreement to an arbitrator, a district court shall appoint an arbitrator on the petition of any of the parties to the arbitration.

§ 3.4.1.6 Arbitration Award. If an arbitrator determines that a violation has occurred, the arbitrator shall assess and award against the Contractor or Subcontractor the amount of penalty as provided in this Article 3.4 and the amount owed the worker. The Owner may use any amounts retained hereunder to pay the worker the amount as designated in the arbitration award. If the Owner has not retained enough from the Contractor or Subcontractor to pay the worker in accordance with the arbitration award, the worker has a right of action against the Contractor and Subcontractor as appropriate, and the surety of

either to receive the amount owed, attorneys' fees and court costs. The Contractor shall promptly furnish a copy of the arbitration award to the Owner.

§ 3.4.1.7 Prevailing Wage Retainage. Money retained pursuant to this Article 3.4 shall be used to pay the claimant or claimants the difference between the amount the worker received in wages for labor on the Project at the rate paid by the Contractor or Subcontractor and the amount the worker would have received at the general prevailing wage rate as provided by the agreement of the claimant and the Contractor or Subcontractor affected, or in the arbitrator's award. The full statutory penalty of $60.00 per day of violation per worker shall be retained by the Owner to offset its administrative costs, pursuant to Texas Government Code §2258.023. Any retained funds in excess of these amounts shall be paid to the Contractor on the earlier of the next progress payment or final payment. Provided, however, that the Owner shall have no duty to release any funds to either the claimant or the Contractor until it has received the notices of agreement or the arbitration award as provided under §§3.4.2 and 3.4.3.

§ 3.4.1.8 No Extension of Time. If the Owner determines that good cause exists to believe a violation has occurred, the Contractor shall not be entitled to an extension of time for any delay arising directly or indirectly from of the procedures set forth in this Article 3.4.

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Owner or Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive. If the Contractor desires to submit an alternate product or method in lieu of what has been specified or shown in the Contract Documents, the Contractor shall comply with the Substitution requirements listed in the Specifications, or if there are no Substitution requirements listed in the Specifications, then the following provisions apply:

§ 3.4.2.1 The Contractor must submit to the Architect and the Owner (i) a full explanation of the proposed substitution and submittal of all supporting data, including technical information, catalog cuts, warranties, test results, installation instructions, operating procedures, and other like information necessary for a complete evaluation of the substitution; (ii) the adjustment, if any, in the Contract Sum, in the event the substitution is acceptable; (iii) the adjustment, if any, in the time of completion of the Contract and the construction schedule in the event the substitution is acceptable; and (v) a statement indicating Contractor accepts the warranty and correction obligations in connection with the proposed substitution as if originally specified by the Architect. Proposals for substitutions shall be to the Architect in sufficient time to allow the Architect no less than ten (10) working days for review. No substitutions will be considered or allowed without the Contractor's submittal of complete substantiating data and information as stated hereinbefore.

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

§ 3.4.4 The Contractor shall only employ or use labor in connection with the Work capable of working harmoniously with all trades, crafts, and any other individuals associated with the Project.

§ 3.4.5. In case the progress of the Work is affected by any undue delay in furnishing or installing any items or materials or equipment required under the Contract Documents because of such conflict involving any such labor agreement or regulation, the Owner may require that other material or equipment of equal kind and quality be provided pursuant to a Change Order or Construction Change Directive.

§ 3.5 WARRANTY

§ 3.5.1 The Contractor warrants to the Owner: (1) that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise; (2) that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit; (3) that the Work will be done strictly in accordance with the Contract Documents; (4) that all products are installed

per the manufacturer's instructions, and in such a way that the manufacturer's warranties are preserved, including the use of a manufacturer-certified installer, if required by the manufacturer; (5) and that the Work, when finally completed, will provide a complete Project that meets the intent of the Contract Documents. The Contractor represents and warrants to the Owner that its materials and workmanship, including without limitation, construction means, methods, procedures and techniques necessary to perform the Work, use of materials, selection of equipment and requirements of product manufacturers are and shall be consistent with: (1) good and sound practices within the construction industry; (2) generally prevailing and accepted industry standards applicable to the Work; (3) requirements of any warranties applicable to the Work subject to Paragraph 3.2.3. Work, materials, or equipment not conforming to these requirements shall be considered defective, and promptly after written notification of non-conformance shall be repaired or replaced by Contractor with Work conforming to this warranty. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Owner or Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.1.1 Contractor further warrants that all materials or equipment of a category or classification will be a product of the same manufacturer and such materials or equipment shall be of the same lot, batch or type and that such materials and equipment will be as specified.

§ 3.5.2 The Contractor agrees to assign to the Owner at the time of final completion of the Work any and all manufacturer's warranties relating to materials and labor used in the Work and further agrees to perform the Work in such manner so as to preserve any and all such manufacturer's warranties.

§ 3.6 TAXES

State Sales and Use Taxes. Sales, use or similar taxes imposed by a governmental authority that are related to the Work and for which the Contractor is liable; provided, however, Owner is a body corporate and politic under the laws of the State of Texas and claims exemption from sales and use taxes under Texas Tax Code Ann. § 151.309, as amended, and the services and materials subject of the Agreement are being secured for use by Owner. Exemption certificates will be provided to Contractor upon request. As a precondition to the Owner reimbursing Contractor for allowable sales and use taxes, Contractor must, on its own, first attempt to use such tax exemption certificates in order to assert the exemption. In the event Contractor's efforts to use the tax exemption certificate is unsuccessful and provided that under the laws of the State of Texas an exemption from sales and use taxes is allowed, Owner will reimburse Contractor for such sales and use taxes upon Contractor providing sufficient and satisfactory documentation to the Williamson County Auditor.

§ 3.7 PERMITS, FEES, NOTICES, AND COMPLIANCE WITH LAWS

§ 3.7.1 Unless otherwise provided, the Contractor shall secure, pay for, and, as soon as practicable, furnish the Owner with copies or certificates of all permits and fees, licenses, and inspections necessary for the proper execution and completion of the Work, including, without limitation, all building permits. All connection charges, assessments, or inspection fees as may be imposed by any municipal agency or utility company are included in the Contract Sum and shall be the Contractor's responsibility.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

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

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from

those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Owner will promptly investigate such conditions and, if the Owner determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will authorize an equitable adjustment in the Contract Sum or Contract Time, or both. If the Owner determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Owner shall promptly notify the Contractor in writing, stating the reasons. If the Contractor disputes the Owner's determination, the Contractor party may assert a Claim as provided in Article 15.

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

§ 3.8 ALLOWANCES

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

.1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and

.3 whenever costs are more than or less than allowances, the Contractor shall, prior to purchasing any such materials, notify the Owner in writing of the cost and whether such cost will exceed the amount of the allowance. If Owner authorizes Contractor to proceed, after receiving the Contractor's estimate of the total cost, then the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent or Contractor's project manager shall be as binding as if given to the Contractor. Important oral communications shall be immediately confirmed in writing.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Owner or Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Owner and Architect require additional time to review. Failure of the Owner or Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

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

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, as provided in the Agreement, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

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

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.10.4 The construction schedule shall be a detailed precedence-style critical path management ("CPM") schedule in a format satisfactory to the Owner that shall (i) provide a graphic representation of all activities and events that will occur during performance of the Work; (ii) identify each phase of construction and occupancy; and (iii) set forth dates that are critical in ensuring the timely and orderly completion of the Work in accordance with the requirements of the Contract Documents (hereinafter referred to as the "Milestone Date"). Upon review and acceptance by the Owner of the Milestone Dates, the construction schedule shall be deemed part of the Contract Documents. If not accepted, the construction schedule shall be promptly revised by the Contractor in accordance with the recommendations of the Owner and resubmitted for acceptance. The Contractor shall monitor the progress of the Work for conformance with the requirements of the construction schedule and shall promptly advise the Owner of any delays or potential delays. The accepted construction schedule shall be updated to reflect actual conditions as set forth in section 3.10.1 or if requested by the Owner. In the event any progress report indicates any delays, the Contractor shall propose an affirmative plan to correct the delay, including overtime and/or additional labor, if necessary. In no event shall any progress report constitute an adjustment in the Contract Time, any Milestone date, or the Contract Sum unless any such adjustment is agreed to by the Owner and authorize pursuant to a Change Order.

§ 3.10.5 In the event the Owner determines that the performance of the Work, as of a Milestone Date, has not progressed or reach the level of completion required by the Contract Documents, the Owner shall have the right to order the Contractor to take corrective measures necessary to expedite the progress of construction, including without limitation, (i) working additional shifts or overtime, (ii) supplying additional manpower, equipment, and facilities, and (iii) other similar measures. Such measures so continue until the progress of the Work complies with the stage of completion required by the Contract Documents. The Owner's right to require such measures is solely for the purpose of ensuring the Contractors compliance with the construction schedule.

§ 3.11 DOCUMENTS AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

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

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

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

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

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

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

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

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

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

equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

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

§ 3.14 CUTTING AND PATCHING

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

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

§ 3.15 CLEANING UP

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

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

§ 3.16 ACCESS TO WORK

The Owner and Architect shall, at all times, have access to the Work in preparation and progress wherever located.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

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

§ 3.18 INDEMNIFICATION

§ 3.18.1 INDEMNITY – OTHER THAN EMPLOYEE PERSONAL INJURY CLAIMS. TO THE FULLEST EXTENT PERMITTED BY LAW, CONTRACTOR SHALL INDEMNIFY, DEFEND, AND HOLD HARMLESS OWNER, ITS EMPLOYEES, AND ASSIGNS (THE "INDEMNIFIED PARTIES" OR "INDEMNITEES") FROM AND AGAINST CLAIMS, DAMAGES, LOSSES AND EXPENSES, INCLUDING BUT NOT LIMITED TO ATTORNEYS' FEES, ARISING OUT OF OR ALLEGED TO BE RESULTING FROM THE PERFORMANCE OF THIS AGREEMENT, TO THE EXTENT CAUSED BY THE NEGLIGENT OR WILLFUL ACTS OR OMISSIONS OF THE CONTRACTOR, SUBCONTRACTORS, SUB-SUBCONTRACTORS, OR ANYONE DIRECTLY OR INDIRECTLY EMPLOYED BY THEM OR ANYONE FOR WHOSE ACTS THEY MAY BE LIABLE. CONTRACTOR SHALL NOT BE REQUIRED TO INDEMNIFY, HOLD HARMLESS OR DEFEND THE INDEMNIFIED PARTIES AGAINST A CLAIM CAUSED BY THE NEGLIGENCE OR FAULT, OR THE BREACH OR VIOLATION OF A STATUTE, ORDINANCE, GOVERNMENTAL REGULATION, STANDARD, OR RULE OF THE INDEMNITEE, OR OTHER PARTY OTHER THAN CONTRACTOR OR ITS AGENT, EMPLOYEE, OR SUBCONTRACTOR OF ANY TIER, EXCEPT THAT CONTRACTOR SHALL INDEMNIFY, HOLD HARMLESS AND DEFEND THE INDEMNIFIED PARTIES AGAINST ANY CLAIMS FOR THE BODILY INJURY OR DEATH OF AN EMPLOYEE OF CONTRACTOR, ITS AGENTS, OR IT SUBCONTRACTORS OF ANY TIER.

§3.18.2 INDEMNITY – EMPLOYEE <u>PERSONAL INJURY CLAIMS</u>. TO THE FULLEST EXTENT PERMITTED BY LAW, CONTRACTOR SHALL INDEMNIFY, DEFEND, AND HOLD HARMLESS THE INDEMNIFIED PARTIES AND SHALL ASSUME ENTIRE RESPONSIBILITY AND LIABILITY (OTHER THAN AS A RESULT OF AN INDEMNIFIED PARTY'S GROSS NEGLIGENCE) FOR ANY CLAIM OR ACTION BASED ON OR ARISING OUT OF THE PERSONAL INJURY, INCLUDING THE DEATH, OF ANY EMPLOYEE OF THE CONTRACTOR, SUBCONTRACTORS, OR ANY SUB-SUBCONTRACTOR, OR OF ANY OTHER ENTITY FOR WHOSE ACTS THEY MAY BE LIABLE, WHICH OCCURRED OR WAS ALLEGED TO HAVE OCCURRED ON THE PROJECT SITE OR IN CONNECTION WITH THE PERFORMANCE OF THE WORK OF THIS AGREEMENT. CONTRACTOR HEREBY INDEMNIFIES THE INDEMNIFIED PARTIES EVEN TO THE EXTENT THAT SUCH PERSONAL INJURY WAS CAUSED OR ALLEGED TO HAVE BEEN CAUSED BY THE COMPARATIVE OR CONCURRENT NEGLIGENCE OF THE STRICT LIABILITY OF ANY INDEMNIFIED PARTY. THIS INDEMNIFICATION SHALL NOT BE LIMITED TO DAMAGES, COMPENSATION, OR BENEFITS PAYABLE UNDER INSURANCE POLICIES, WORKERS COMPENSATION ACTS, DISABILITY BENEFITS ACTS, OR OTHER EMPLOYEES BENEFIT ACTS.

§3.18.3 THE CONTRACTOR'S INDEMNITY OBLIGATIONS UNDER THIS SECTION 3.18 SHALL ALSO SPECIFICALLY INCLUDE, WITHOUT LIMITATION, ALL FINES, PENALTIES, DAMAGES, LIABILITY, COSTS, EXPENSES (INCLUDING, WITHOUT LIMITATION, REASONABLE ATTORNEYS' FEES) ARISING OUT OF, OR IN CONNECTION WITH, ANY (I) VIOLATION OF OR FAILURE TO COMPLY WITH ANY LAW, STATUTE, ORDINANCE, RULE, REGULATION, CODE OR REQUIREMENT OF A PUBLIC AUTHORITY THAT BEARS UPON THE PERFORMANCE OF THE WORK BY THE CONTRACTOR, A SUBCONTRACTOR, OR ANY PERSON OR ENTITY FOR WHOM EITHER IS RESPONSIBLE, (II) MEANS, METHODS, PROCEDURES, TECHNIQUES, OR SEQUENCES OF EXECUTION OR PERFORMANCE OF THE WORK, AND (III) FAILURE TO SECURE AND PAY FOR PERMITS, FEES, APPROVALS, LICENSES, AND INSPECTIONS AS REQUIRED UNDER THE CONTRACT DOCUMENTS, OR ANY VIOLATION OF ANY PERMIT OR OTHER APPROVAL OF A PUBLIC AUTHORITY APPLICABLE TO THE WORK, BY THE CONTRACTOR, A SUBCONTRACTOR, OR ANY PERSON OR ENTITY FOR WHOM EITHER IS RESPONSIBLE.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

§ 4.1.1 The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

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

§ 4.2 ADMINISTRATION OF THE CONTRACT
§ 4.2.1 The Architect will provide administration of the Contract as described in the Owner-Architect Agreement. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

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

§ 4.2.4 COMMUNICATIONS AND CONTRACT ADMINISTRATION
Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to relate relevant communications between Owner and Architect to the Architect. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 4.2.5 If included in Architect's scope of work, the agreement between Owner and Architect, or if requested by the Owner, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts based on the Architect's evaluations of the Contractor's Applications for Payment.

§ 4.2.6 To the extent permitted by the agreement between Owner and Architect, the Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect, in consultation with the Owner, will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect or the Owner to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 To the extent provided in the agreement between Owner and Architect, the Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Owner and Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the

purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 If requested by Owner, the Architect will prepare Change Orders and Construction Change Directives with the Owner's prior written consent, but the Architect may authorize minor changes in the Work as provided in the agreement between Owner and Architect, or in Section 7.4 of these General Conditions. If requested by Owner, the Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

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

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

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

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings.

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

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

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

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

§ 5.2 AWARD OF SUBCONTRACTS

§ 5.2.1 For Construction Manager-At-Risk Agreements. The Construction Manager shall publicly advertise for bids or proposals and receive bids or proposals from trade contractors or Subcontractors for the performance of all major elements of the work other than the minor work that may be included in the general conditions. The Construction Manager may seek to perform portions of the work itself if:

(A) the Construction Manager submits its bid or proposal for those portions of the Work in the same manner as all other trade contractors or Subcontractors; and

(B) the Owner determines that the Construction Manager's bid or proposal provides the best value for the Owner.

§ 5.2.1.1 REVIEW OF BIDS OR PROPOSALS. Construction Manager shall review all trade contractor or Subcontractor bids or proposals in a manner that does not disclose the contents of the bid or proposal during the selection process to a person not employed by the Construction Manger, Architect, Engineer, or Owner. All bids or proposals shall be made available to the Owner on request and to the public after the later of the award of the contract or the seventh day after the date of final selection of bids or proposals. If the Construction Manager reviews, evaluates, and recommends to the Owner a bid or proposal from a trade contractor or subcontractor but the Owner requires another bid or proposal to be accepted, the Owner shall compensate the Construction Manager by a change in the Contract Sum, Contract Time, or Cost of the Work for any additional cost and risk that the Construction manager incurs because of the Owner's requirement that another bid or proposal be accepted.

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

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

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

§ 5.3 SUBCONTRACTUAL RELATIONS

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

§ 5.3.2 All subcontracts shall be in writing and, if requested, Contractor shall provide Owner with copies of executed subcontracts.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS
§ 5.4.1 This Contract is for Owner's benefit, its successors and assigns who, as well as Contractor, may directly enforce all rights and warranties, express or implied herein, but Subcontractors shall have recourse only against Contractor and not against Owner. Owner may rely solely upon Contractor for enforcement of all Subcontracts. To effect such purpose, Contractor assigns to Owner all right to bring any actions against subcontractors and material vendors without waiver by Owner of his right against Contractor because of defaults, delays and effects for which a subcontractor or material vendor may also be liable, said assignment being effective only if:

.1 Contractor is in default under the Contract Documents; or

.2 Owner has terminated the Contract in accordance with the Contract Documents; and

.3 Only for those subcontract agreements which the Owner accepts by notifying the Subcontractor and Contractor in writing; and

.4 The assignment is subject to the prior rights of the surety, if any, obligated under any bond relating to the Contract.

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

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

§5.4.4 The Architect and the Owner shall have the right to request from any Subcontractor at any time during the course of construction, a notarized affidavit stating the amount of monies which have been paid to the Subcontractor as of any certain stipulated date.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS
§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

§ 6.2 MUTUAL RESPONSIBILITY
§ 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall

connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect and the Owner apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

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

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

§ 6.3 OWNER'S RIGHT TO CLEAN UP
If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK
§ 7.1 GENERAL
§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

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

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work. Except as permitted in Section 7.3 and Section 9.7.2, a change in the Contract Sum or the Contract Time shall be accomplished only by Change Order. Accordingly, no course of conduct or dealings between the parties, nor express or implied acceptance of alterations or additions to the Work, and no claim that Owner has been unjustly enriched by any alteration of or addition to the Work, whether or not there is, in fact, any unjust enrichment to the Work, shall be the basis of any Claim to an increase in any amounts due under the Contract Documents or a change in any time period provided for in the Contract Documents.

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

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

§ 7.2.2 Contractor's Change Order shall set forth in clear and precise detail breakdowns of labor and materials for all trades involved and the estimated impact on the dates of Substantial Completion. Contractor shall furnish supporting data as reasonably requested by Owner.

§ 7.2.3 Agreement on any Change Order shall constitute a final settlement of all matters relating to the change in the Work that is the subject of the Change Order, including, but not limited to, all direct and indirect costs associated with such change and any and all adjustments to the Contract Sum and the construction schedule.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

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

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

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

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;

.2 Unit prices stated in the Contract Documents or subsequently agreed upon;

.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

.4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

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

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

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Owner shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Owner or Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

.1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;

.2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and

.5 Additional costs of supervision and field office personnel directly attributable to the change.

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

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

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

§ 7.4 MINOR CHANGES IN THE WORK

If permitted in the agreement between Owner and Architect, the Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents.

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

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

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

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

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

§ 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract and are a material element of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

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

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect and Owner determines may justify delay, then the Contract Time shall be extended by Change Order to the extent such delay will prevent the Contractor from achieving Substantial Completion within the Contract Time and if the performance of the Work is not, was not, or would not have been delayed by any other cause for which the Contractor is not entitled to an extension in the Contract Time under the Contract Documents. The Contractor further acknowledges and agrees that adjustments in the Contract Time will be permitted for a delay only to the extent such delay (i) is not caused, or could not have been anticipated, by the Contractor, and (ii) could not be limited or avoided by the Contractor's timely notice to the Owner of the delay or reasonable likelihood that a delay will occur.

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

§ 8.3.3 Notwithstanding anything contained in the Contract Documents to the contrary, the Contractor's sole remedy for any (1) delay in the commencement, prosecution or completion of the Work, (2) hindrance or obstruction in the performance of the Work, (3) loss of productivity, or (4) other similar claims (collectively referred in this Subparagraph 8.3.3 as "Delay or Delays"), whether or not such Delays are foreseeable, shall be an extension of time in which to complete the Work. In no event shall the Contractor be entitled to any other compensation or recovery of any damages, costs, or attorneys' fees, caused by any Delays, unknown site conditions, errors, inconsistencies, or omissions in the Drawings and Specifications, or concealed or unknown conditions, including, without limitation, consequential damages, lost opportunity costs, impact damages or other similar damages; provided however that Contractor may be entitled to additional time as provided under Section 8.3.1.

§ 8.3.4 If the Contractor submits a progress report indicating, or otherwise expresses an intention to achieve, completion of the Work prior to any completion date required by the Contract Documents or expiration of the Contract Time, no liability of the Owner to the Contractor for any failure of the Contractor to so complete the Work shall be created or implied.

§ 8.3.5 Owner shall have the right to occupy, without prejudice to rights of either party, any completed or substantially completed portions of the Work, notwithstanding the fact that time for completion of entire Work, or portions thereof, may not be expired. Occupancy and use by Owner shall not constitute, in itself, acceptance of the Work.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

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

§ 9.2 SCHEDULE OF VALUES

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

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 As provided in the Agreement and in the Contract Documents, the Contractor shall submit to the Owner and Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2., for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the

Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

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

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

§ 9.3.1.3 If requested by Owner or required elsewhere in the Contract Documents, Each Application for Payment shall be accompanied by the following, all in a form and substance satisfactory to the Owner:

(i) With each Application for Payment: a current Sworn Statement from the Contractor setting forth all Subcontractors and all material suppliers with whom the Contractor has subcontracted, the amount of each such subcontract, the amount requested for any Subcontractor or material supplier in the Application for Payment, and the amount to be paid to the Contractor from such progress payment;

(ii) With each Application for Payment: a duly executed Conditional Waiver and Release on Progress Payment from the Contractor and Subcontractors establishing receipt of payment or satisfaction of the payment requested by the Contractor in the current Application for Payment;

(iii) Commencing with the second Application for Payment submitted by the Contractor, a duly executed Unconditional Waiver and Release on Progress Payment from Contractor and all Subcontractors, material suppliers and, where appropriate, lower tier subcontractors that have billed more than $5,000 on a single application of payment, establishing receipt of payment or satisfaction of payment of all amounts requested on behalf of such entities and disbursed prior to submittal by the Contractor of the current Application for Payment;

(iv) With the Final Application for Payment: Contractor shall submit a Conditional Waiver and Release on Final Payment as required by Texas Property Code 53.284. Upon receipt of final payment, Contractor shall submit an Unconditional Waiver and Release on Final Payment as required by Texas Property Code 53.284; and

(v) Such other information, documentation, and materials as the Owner, or the title insurer may require in order to ensure that Owner's property is free of lien claims. Such other documents may include, without limitation, original copies of lien or bond claim releases suitable for filing with the County Clerk in Williamson County, Texas.

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

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

§ 9.3.3.1 The Contractor further expressly undertakes to defend Owner, at the Contractor's sole expense, against any actions, lawsuits, or proceedings brought against Owner as a result of liens filed against the Work, the site of any of the Work, the Project site and any improvements thereon, or any portion of the property of any of Owner (referred to collectively as "liens" in this Section 9.3.3), provide the Owner has paid Contractor pursuant to the requirements of the Contract Documents. The Contractor hereby agrees to indemnify and hold Owner harmless against any such liens or claims of lien and agrees to pay any judgment or lien resulting from any such actions, lawsuits, or proceedings.

§ 9.3.3.2 The Owner shall release any payments withheld due to a lien or bond claims if the Contractor obtains security acceptable to the Owner, however, the Contractor shall not be relieved of any responsibilities or obligations under this Section 9.3.3, including, without limitation, the duty to defend and indemnify Owner.

§ 9.3.3.3 Retainage. The Owner shall withhold from each progress payment, as retainage, five percent (5%) of the total earned amount. Retainage so withheld shall be managed in conformance with Subchapter B, Chapter 2252 of the Texas Government Code. Any request for reduction or release of retainage shall be accompanied by written consent of the Contractor's Surety. No such request shall be made until the Contractor has earned at least sixty-five percent (65%) of the total Contract Price.

§ 9.3.3.4 For purposes of Texas Government Code § 2251.021 (a)(2), the date the performance of service is completed is the date when the Owner's representative approves the Application for Payment.

§ 9.4 CERTIFICATES FOR PAYMENT

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

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

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

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

.1 defective Work not remedied;
.2 third party claims filed or reasonable evidence indicating probable filing of such claims;
.3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
.5 damage to the Owner or a separate contractor;
.6 failure to maintain the scheduled progress, or reasonable evidence that the Work will not be completed within the Contract Time;
.7 failure to comply with the requirements of Texas Government Code Chapter 2258 (Prevailing Wage Law);
.8 failure to include sufficient documentation to support the amount of payment requested for the Project;
.9 failure to obtain, maintain, or renew insurance coverage, payment/performance bonds or warranty bond required by the Contract Documents; or
.10 repeated failure to carry out the Work in accordance with the Contract Documents.

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

§ 9.6 PROGRESS PAYMENTS
§ 9.6.1 The Owner shall make payment in the manner and within the time provided in the Contract Documents and in accordance with Chapter 2251 of the Texas Government Code.

§ 9.6.2 The Contractor shall pay each Subcontractor no later than 10 days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

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

§ 9.6.4 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2.

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

§ 9.7 FAILURE OF PAYMENT
§ 9.7.1 If the Architect is required to issue Certificates for Payment and, through no fault of the Contractor, the Architect fails to timely issue Certificates for Payment in the time permitted in the Contract Documents, or if the Owner does not pay the Contractor by the date established in the Contract Documents, then the Contractor may, upon twenty-one days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received.

§ 9.7.2 If the Owner is entitled to reimbursement or payment from the Contractor under or pursuant to the Contract Documents, such payment shall be made promptly upon demand by the Owner. Notwithstanding anything contained in the Contract Documents to the contrary, if the Contractor fails to promptly make any payment due the Owner, or if the Owner incurs any costs and expenses to cure any default of the Contractor or to correct defective work, the Owner shall have an absolute right to offset such amount against the Contract Sum and may, in the Owner's sole discretion, elect either to (i) deduct

an amount equal to that which the Owner is entitled from any payment then or thereafter due the Contractor from the Owner, or (ii) issue a written notice to the Contractor reducing the Contract Sum by an amount equal to that which the Owner is entitled.

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use; provided, however, that as a condition precedent to Substantial Completion, the Owner has received all certificates of occupancy and any other permits, approvals, licenses, and other documents from any governmental authority having jurisdiction thereof necessary for the beneficial occupancy of the Project.

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

§ 9.8.3 Upon receipt of the Contractor's punch list, the Owner and Architect will examine the Work to determine whether the Work or designated portion thereof is substantially complete. If the Owner and/or Architect's examination discloses any item, whether or not included on the Contractor's punch list, that is not sufficiently complete in accordance with the Contract Documents, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Owner or Architect. In such case, the Contractor shall then submit a request for another examination by the Owner or Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect, if required by the Contract Documents, or Owner will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Unless otherwise provided, Contractor shall complete all items on the punch list within 30 days of Substantial Completion. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5, the surety, and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld.

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

§ 9.9.3 Partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Owner and Architect will make such inspection and, when the Owner and Architect 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 the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled. All warranties and guarantees required under or pursuant to the Contract Documents shall be assembled and delivered by the Contractor to the Architect as part of the final Application for Payment. The final Certificate for Payment will not be issued by the Architect until all warranties and guarantees have been received and accepted by the Owner.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Owner and Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work have been paid or otherwise satisfied, within the period of time required by Chapter 2251 of the Texas Government Code, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety to final payment, (5) a warranty bond in a form acceptable to Owner, and (6) other data establishing payment or satisfaction of obligations, such as receipts, unconditional full and final releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner.

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

.1 Claims, security interests or encumbrances arising out of the Contract and unsettled;
.2 failure of the Work to comply with the requirements of the Contract Documents; or
.3 terms of warranties required by the Contract Documents.

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

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 SAFETY OF PERSONS AND PROPERTY

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

.1 employees on the Work and other persons who may be affected thereby;
.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss. Notwithstanding any language to the contrary, the Owner shall not have any responsibility for job site inspections or safety recommendations. Any inspections or observations by the Owner or the Architect are solely for the benefit of the Owner and shall not create any duties or obligations to anyone else.

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

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

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

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

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

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

§ 10.2.9 When all or a portion of the Work is suspended for any reason, the Contractor shall securely fasten down all covering and fully protect the Work, as necessary, from injury or damage by any cause.

§ 10.2.10 The Contractor shall promptly report in writing to the Owner and Architect all accidents arising out of or in connection with the Work that cause death, personal injury, or property damage.

§ 10.3 HAZARDOUS MATERIALS
§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the

Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written notice from the Owner.

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

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

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

ARTICLE 11 INSURANCE AND BONDS
§ 11.1 CONTRACTOR'S LIABILITY INSURANCE
§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

.1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
.4 Claims for damages insured by usual personal injury liability coverage;
.5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
.6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
.7 Claims for bodily injury or property damage arising out of completed operations, which coverage shall be maintained for no less than four (4) years following final payment; and
.8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Agreement or the Contract Documents. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the

period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Unless otherwise provided, copies of the insurance policies, in form acceptable to the Owner, shall provided to Owner within 30 days of Owner's request. Except as otherwise provided, all of the policies provided shall name Owner as an additional insured, and such policies shall immediately deliver to Owner copies of all such insurance policies, together with certificates by the insurer evidencing Owner's coverage there under. Each policy of insurance obtained by Contractor pursuant to the Contract Documents shall provide, by endorsement or otherwise (i) that such policy shall not be canceled, endorsed, altered or reissued to effect a change in coverage for any reason or to any extent whatsoever unless the insurer shall have first given Owner and Lender at least thirty (30) days prior written notice thereof, and (ii) that Owner may, but shall not be obligated to, make premium payments to prevent the cancellation, endorsement, alteration or reissuance of such policy and such payments shall be accepted by the insurer to prevent the same. Such policies shall provide, by endorsement or otherwise, that Contractor shall be solely responsible for the payment of all premiums under the policies, and that Owner shall have no obligation for the payment thereof, notwithstanding that Owner is named as additional insured under the policy. Any insured loss or claim of loss shall be adjusted to the Owner, and any settlement payments shall be made payable to the Owner as a trustee for the insureds, as their interests may appear. Upon the occurrence of an insured loss or claim of loss, monies received will be held by Owner who shall make distribution in accordance with an agreement to be reached in such event between Owner and Contractor. If the parties are unable to agree between themselves on the settlement of the loss, such dispute shall be resolved in accordance with section 15, below, but the Work of the Project shall nevertheless progress during any such period of dispute without prejudice to the rights of any party to the dispute. The Contractor shall be responsible for any loss within the deductible area of the policy. If Owner is damaged by the failure of Contractor to purchase or maintain such insurance, then Contractor shall bear all costs properly attributable thereto. The Contractor shall affect and maintain similar property insurance on portions of the Work stored off the site or in transit when such portions of the Work are to be included. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until Final Completion of the Project.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.2 OWNER'S LIABILITY INSURANCE
The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.3 PROPERTY INSURANCE
§ 11.3.1 Unless otherwise provided in the Contract Documents, the Contractor shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake,

flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss as well as coverage for building materials while in transit or building materials suitably stored at a temporary location. Property insurance provided by the Contractor shall not cover any tools, apparatus, machinery, scaffolding, hoists, forms, staging, shoring, and other similar items commonly referred to as construction equipment that may be on the site and the capital value of which is not included in the Work. The Contractor shall make its own arrangements for any insurance it may require on such construction equipment. Any such policy obtained by the Contractor under this Section 11.3.1 shall include a waiver of subrogation in accordance with the requirements of Section 11.3.4.

§ 11.3.1.2 If the Contractor does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Contractor shall so inform the Owner in writing prior to commencement of the Work. If the Owner is damaged by the failure or neglect of the Contractor to purchase or maintain insurance as described above, without so notifying the Owner in writing, then the Contractor shall bear all reasonable costs properly attributable thereto.

§ 11.3.1.3 Contractor shall be responsible for any deductibles to the extent that the loss arose out of or was cause by Contractor's negligence or breach of the Agreement.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.4 WAIVERS OF SUBROGATION
The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent of actual recovery of any insurance proceeds under any property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance. However, this waiver shall not apply to property insurance purchased by Owner after completion of the Work or Final Payment, whichever comes first. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.5 A loss insured under the property insurance shall be adjusted in good faith and made payable to the Owner in good faith for the insureds, as their interests may appear. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.4 BONDS
§ 11.4.1 The Contractor is required to tender to Owner, prior to commencing the Work, performance and payment bonds, as required by law. In the event Contractor fails to provide such bonds within the time

provided by the Agreement, Owner may immediately, upon notice of such failure, or within a reasonable time thereafter, at its sole option and discretion: (1) void this Agreement in its entirety; or (2) procure such bonds on behalf of the Contractor, deducting such amounts from the Contract Price. In the event Owner voids the Agreement under this section, Contractor may forfeit its bid bond.

§ 11.4.2 A Performance Bond is required if the Contract Price is in excess of $50,000. The performance bond is solely for the protection of the Owner, in the full amount of the Contract Price and conditioned on the faithful performance of the Work in accordance with the Contract Documents. The form of the bond shall be approved by the Owner.

§ 11.4.3 A Payment Bond is required if the Contract Price is in excess of $25,000. A payment bond is payable to the Owner, in the full amount of the Contract Price and solely for the protection and use of payment bond beneficiaries who have a direct contractual relationship with the Contractor or a supplier of required materials or labor. The form of bond shall be approved by the Owner.

§ 11.4.4 Warranty Bond. Upon Substantial Completion and prior to final completion and final payment, Contractor shall provide Owner with a Warranty Bond in the sum of 10% of the Contact Price or 10% of the Guaranteed Maximum Price for Construction Manager-At-Risk Agreements for the entire warranty period set out in the Contract Documents. The form of bond shall be approved by the Owner.

§ 11.4.5 Corporate sureties authorized to issue bonds shall be qualified and comply with relevant provisions of the Texas Insurance Code.

§ 11.4.6 Each bond shall be executed by a corporate surety or sureties authorized to do business in the State of Texas and acceptable to the Owner. If any bond is for more than 10 percent of the surety's capital and surplus, the Owner may require certification that the company has reinsured the excess portion with one or more reinsurers authorized, accredited, or trusteed to do business in the State. A reinsurer may not reinsure for more than 10 percent of its capital and surplus. If a surety upon a bond loses its authority to do business in the State, the Contractor shall within thirty (30) days after such loss furnish a replacement bond at no added cost to the Owner.

§ 11.4.7 Each bond shall be accompanied by a valid Power-of-Attorney (issued by the surety company and attached, signed and sealed with the corporate embosses seal, to the bond) authorizing the attorney in fact who signs the bond to commit the company to the terms of the bond, and stating any limit in the amount for which the attorney can issue a single bond.

§ 11.4.8 The process of requiring and accepting bonds and making claims thereunder shall be conducted in compliance with Chapter 2253, Texas Government Code. If for any reason a statutory payment or performance bond is not honored by the surety, the Contractor shall fully indemnify and hold the Owner harmless of and from any costs, losses, obligations or liabilities it incurs as a result.

§ 11.4.9 Owner shall furnish certified copies of a payment bond and the related Agreement between Owner and Contractor to any qualified person seeking copies who complies with §2253.026, Texas Government Code.

§ 11.4.10 Claims on Payment Bonds. Claims on payment bonds must be sent directly to the Contractor and its surety in accordance with § 2253.041, Texas Government Code. All Payment Bond claimants are cautioned that no lien exists on the funds unpaid to the Contractor on such contract, and that reliance on notices sent to the Owner may result in loss of their rights against the Contractor and/or its surety. The Owner is not responsible in any manner to a claimant for collection of unpaid bills, and accepts no such responsibility because of any representation by any agent or employee.

§ 11.4.11 Payment Claims when Payment Bond not Required. When the value of the Agreement between Owner and the Contractor is less than $25,000.00, claimants and their rights are governed by Texas Property Code, §§ 53.231 – 53.239. These provisions set out the requirements for filing a valid

lien on funds unpaid to the Contractor as of the time of filing the claim, actions necessary to release the lien and satisfaction of such claims.

§11.4.12 Sureties shall be listed on the Department of the Treasury's Listing of Approved Sureties stating companies holding Certificates of Authority as acceptable sureties on Federal Bonds and acceptable reinsuring companies (Department Circular 570).

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

§ 11.5.2 If the Owner is damaged by failure of the Contractor to purchase or maintain insurance required under Article 11, then the Contractor shall bear all reasonable costs (including attorneys' fees and court and settlement expenses) properly attributable thereto.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK
§ 12.1 UNCOVERING OF WORK
§ 12.1.1 If a portion of the Work is covered contrary to the Owner or Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Owner or Architect, be uncovered for examination and be replaced at the Contractor's expense without change in the Contract Time. If prior to the date of Substantial Completion the Contractor, a Subcontractor, or anyone for whom either is responsible uses or damages any portion of the Work (other than start-up), including, without limitation, mechanical, electrical, plumbing, and other building systems, machinery, equipment, or other mechanical device, the Contractor shall cause such item to be restored to "like new" condition at no expense to the Owner.

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

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

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION
§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so. The Owner shall give such notice promptly after discovery of the condition. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may, without prejudice to any other remedies, correct it in accordance with Section 2.4 or file a claim with the surety of any applicable warranty bond.

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

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

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

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

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

ARTICLE 13 MISCELLANEOUS PROVISIONS
§ 13.1 GOVERNING LAW
The Contract shall be governed by the law of Williamson County, Texas.

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

§ 13.3 WRITTEN NOTICE
Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

§ 13.4 RIGHTS AND REMEDIES
§ 13.4.1 Except as expressly provided in the Contract Documents, duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

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

§ 13.5 TESTS AND INSPECTIONS
§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful

orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority. The Contractor shall give the Owner and Architect timely notice of when and where tests and inspections are to be made so that the Owner and Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Owner and Architect of when and where tests and inspections are to be made so that the Owner and Architect may be present for such procedures.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense. The Contractor also agrees the cost of testing services related to remedial operations performed to correct deficiencies in the Work, shall be borne by the Contractor.

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

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

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

§ 13.6 INTEREST
The rate of interest that accrues on an overdue payment is the rate in effect on September 1 of the fiscal year in which the payment becomes overdue. The rate in effect on September 1 is equal to the sum of:
(1) one percent; and
(2) the prime rate as published in the Wall Street Journal on the first day of July of the preceding fiscal year that does not fall on a Saturday or Sunday pursuant to §2251.025 of the Texas Government Code.

§ 13.7 TIME LIMITS ON CLAIMS
The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the time limits provided by law. Nothing herein shall be construed as shortening the period of time Owner has for commencing claims to less than what is required by law.

§ 13.8 Application To Subcontracts
Any specific requirement in this Contract that the responsibilities or obligations of Contractor also apply to a Subcontractor is added for emphasis and are also hereby deemed to include a Subcontractor of any tier. The omission of a reference to a Subcontractor in connection with any of Contractor's responsibilities or obligations shall not be construed to diminish, abrogate or limit any responsibilities or obligations of a Subcontractor of any tier under the Contract Documents or the applicable subcontract.

§ 13.10 GENERAL PROVISIONS
§ 13.10.1 All personal pronouns used in this Contract, whether used in the masculine, feminine, or neuter gender, shall include all other genders; and the singular shall included the plural and vice versa. Titles of articles, sections, and subsections are for convenience only and neither limit nor amplify the provisions of this Contract. The use herein of the word "including," when following any general statement, term, or matter, shall not be construed to limit such statement, term, or matter to the specific items or matters set

forth immediately following such word or to similar items or matters, whether or not non-limiting language (such words as "without limitation," or "but not limited to," or words of similar import) is used with reference thereto, but rather shall be deemed to refer to all other items or matters that could reasonably fall within the broadest possible scope of such general statement, term, or matter.

§ 13.10.2 Wherever possible, each provision of this Agreement shall be interpreted in a manner as to be effective and valid under applicable law. If, however, any provision of this Agreement, or portion thereof, is prohibited by law or found invalid under any law, only such provision or portion thereof shall be ineffective, without in any manner invalidating or affecting the remaining provisions of this Agreement or valid portions of such provision, which are hereby deemed servable.

§ 13.11 NO ORAL WAIVER
The Provisions of the Contract Documents shall not be changed, amended, waived, or otherwise modified in any respect except by a writing signed by Owner. No person is authorized on behalf of Owner to orally change, amend, waive, or otherwise modify the terms of the Contract Documents or any of the Contractor's duties or obligations under or arising out of the Contract Documents. Any change, waiver, approval, or consent granted to the Contractor shall be limited to the specific matters stated in the writing signed by Owner, and shall not relieve Contractor of any other of the duties and obligations under the Contract Documents. No "constructive" changes shall be allowed.

§ 13.12 Texas Public Information Act. To the extent, if any, that any provision in the Contract Documents is in conflict with Tex. Gov't Code 552.001 et seq., as amended (the "Public Information Act"), the same shall be of no force or effect. Furthermore, it is expressly understood and agreed that Owner, its officers and employees may request advice, decisions and opinions of the Attorney General of the State of Texas in regard to the application of the Public Information Act to any information or data furnished to Owner whether or not the same are available to the public. It is further understood that Owner, its officers and employees shall have the right to rely on the advice, decisions and opinions of the Attorney General, and that Owner, its officers and employees shall have no liability or obligation to Contractor for the disclosure to the public, or to any person or persons, of any software or a part thereof, or other items or data furnished to Owner by Contractor in reliance of any advice, decision or opinion of the Attorney General of the State of Texas.

§ 13.13 Equal Opportunity in Employment. The Contractor agrees that during the performance of the Agreement it will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Parties will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; termination; rates of pay or other forms of compensation, and selection for training, including apprenticeship.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT
§ 14.1 TERMINATION BY THE CONTRACTOR
§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 90 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency that requires all Work to be stopped; or

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on an undisputed Certificate for Payment within the time stated in the Contract Documents.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon 30 days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 fails to commence the Work in accordance with the provisions of this Contract,

.2 fails to prosecute the Work to completion thereof in a diligent, efficient, timely, workmanlike, skillful and careful manner and in strict accordance with the provisions of the Contract,

.3 fails to use an adequate amount or quality of personnel or equipment to complete the Work without undue delay,

.4 fails to perform any of its obligations under the Contract,

.5 fails to make prompt payments when due to its Subcontractors and Suppliers, or as required by Texas Government Code 2251,

.6 files any petition or other pleading seeking any relief under any provisions of the Federal Bankruptcy Act, as amended, or any other federal or state statute or law providing for reorganization of debts or other relief from creditors, permits a receiver or other person to be appointed on account of its insolvency or financial condition, or becomes insolvent,

.7 creates any situation or state of facts which would authorize or permit an involuntary petition in bankruptcy to be filed against Contractor, or

.8 has not met or in Owner's opinion will not meet the dates of Substantial Completion set forth in the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, in its sole and absolute discretion, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, 30 days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished. In the event that a final decision under section 15, below, is rendered that sufficient cause did not exist for termination under this section 14.2, then the termination shall be considered a termination for convenience, under section 14.4, below.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages and costs incurred by the Owner in finishing the Work and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

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

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

.1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

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

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

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 Upon such termination, the Contractor shall recover the amounts provided in Section 10.1.3 of the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 NOTICE OF CLAIMS

Claims for events arising during the performance of the Work by Contractor must be initiated by written notice to the other party with a copy sent to the Architect; provided, however, that the claimant shall use its best efforts to furnish the other party, as expeditiously as possible, with notice of any Claim including, without limitation, those in connection with concealed or unknown conditions, once such claim is recognized, and shall take steps to mitigate the alleged or potential damages, delay, or other adverse consequences arising out of the condition that is the cause of such a Claim. Claims by Contractor must be initiated within 10 business days after occurrence of the event giving rise to such Claim or within 10 business days after the claimant first recognizes the condition giving rise to the Claim, whichever is later. Claims may also be reserved in writing within the time limits set forth in this Section 15.1.2. Any notice of Claim or reservation of Claim must clearly identify the alleged cause and the nature of the Claim and include data and information available to the claimant that will facilitate prompt verification and evaluation of the Claim.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the Contract Documents.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST
If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME
§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

§ 15.3 MEDIATION
§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived shall be subject to mediation as a condition precedent to seeking redress in a court of competent jurisdiction.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation, which shall consist of a single mediator who is knowledgeable about the subject matter of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract.

§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in Williamson County, Texas. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§15.3.4 All disputes not resolved through mediation shall be decided in litigation in Williamson County, Texas.

§ 15.3.5 No waiver of Immunity. Nothing in the Contract Documents shall be deemed to waive, modify or amend any legal defense available at law or in equity to Owner, its past or present officers, employees, or agents, nor to create any legal rights or claim on behalf of any third party. Owner does not waive, modify, or alter to any extent whatsoever the availability of the defense of governmental immunity under the laws of the State of Texas and of the United States.

PROPOSAL AFFIDAVIT

This form must be completed, signed, notarized and returned with Proposal package

The undersigned certifies that the RFP and the Respondent's Proposal have been carefully reviewed and are submitted as correct and final. Respondent further certifies and agrees to furnish any and/or all goods and/or services upon which prices are extended at the price Proposal, and upon the conditions contained in the RFP.

I hereby certify that the foregoing Proposal has not been prepared in collusion with any other Respondent or other person or persons engaged in the same line of business prior to the official opening of this Proposal. Further, I certify that the Respondent is not now, nor has been for the past six (6) months, directly or indirectly concerned in any pool or agreement or combination, to control the price of services/commodities Proposal on, or to influence any person or persons to submit a Proposal or not to submit a Proposal thereon."

Name of Respondent:	
Address of Respondent:	
Email:	
Telephone:	
Printed Name of Person Submitting Affidavit:	
Signature of Person Submitting Affidavit:	

Cooperative Purchasing Program

Check one of the following options below. A non-affirmative Proposal will in no way have a negative impact on the County's evaluation of the Proposal.

☐	I will offer the quoted prices to all authorized entities during the term of the County's Contract.
☐	I will not offer the quoted prices to all authorized entities.

If no box is checked, the Respondent agrees to make best efforts in good faith to offer the quoted prices to all authorized entities.

BEFORE ME, the undersigned authority, a Notary Public, personally appeared _____ (*Name of Signer*), who after being by me duly sworn, did depose and say: "I, _____, (*Name of Signer*) am a duly authorized officer of/agent for _____ (*Name of Respondent*) and have been duly authorized to execute the foregoing on behalf of the said _____ (*Name of Respondent*).

SUBSCRIBED AND SWORN to before me by the above-named _____

on this the _____ day of _____, 20_____.

_____

Notary Public in and for

The State of _____

The County of _____

SIGNATURE AND NOTARY NOT REQUIRED IF COMPLETING IN BIDSYNC ELECTRONICALLY.

CONFLICT OF INTEREST QUESTIONNAIRE

For vendor or other person doing business with local governmental entity

Form CIQ

This questionnaire is being filed in accordance with chapter 176 of the Local Government Code by a person doing business with the governmental entity.

By law this questionnaire must be filed with the records administrator of the local government not later than the 7th business day after the date the person becomes aware of facts that require the statement to be filed. See Section 176.006, Local Government Code.

A person commits an offense if the person violates Section 176.006, Local Government Code. An offense under this section is a Class C misdemeanor.

OFFICE USE ONLY

Date Received

1 **Name of person doing business with local governmental entity.**

2 ☐ **Check this box if you are filing an update to a previously filed questionnaire.**

(The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than September 1 of the year for which an activity described in Section 176.006(a), Local Government Code, is pending and not later than the 7th business day after the date the originally filed questionnaire becomes incomplete or inaccurate.)

3 **Describe each affiliation or business relationship with an employee or contractor of the local governmental entity who makes recommendations to a local government officer of the local governmental entity with respect to expenditure of money.**

4 **Describe each affiliation or business relationship with a person who is a local government officer and who appoints or employs a local government officer of the local governmental entity that is the subject of this questionnaire.**

CONFLICT OF INTEREST QUESTIONNAIRE

For vendor or other person doing business with local governmental entity

Form CIQ
Page 2

5 **Name of local government officer with whom filer has affiliation or business relationship.**
(Complete this section only if the answer to A, B, or C is YES.)

This section, item 5 including subparts A, B, C & D, must be completed for each officer with whom the filer has affiliation or other relationship. Attach additional pages to this Form CIQ as necessary.

A. Is the local government officer named in this section receiving or likely to receive taxable income from the filer of the questionnaire?

☐ Yes ☐ No

B. Is the filer of the questionnaire receiving or likely to receive taxable income from or at the direction of the local government officer named in this section AND the taxable income is not from the local governmental entity?

☐ Yes ☐ No

C. Is the filer of this questionnaire affiliated with a corporation or other business entity that the local government officer serves as an officer or director, or holds an ownership of 10 percent or more?

☐ Yes ☐ No

D. Describe each affiliation or business relationship.

6. Describe any other affiliation or business relationship that might cause conflict of interest:

7

Signature of person doing business with the governmental entity	Date

Signature not required if completing in BIDSYNC electronically.

DEBARMENT AND LICENSING CERTIFICATION

STATE OF TEXAS §
§
COUNTY OF WILLIAMSON §

I, the undersigned, being duly sworn or under penalty of perjury under the laws of the United States and the State of Texas, certifies that Firm named herein below and its principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from covered transactions by any federal department or agency:
(b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (federal, state or local) transaction or contract under a public transaction; violation of federal or state antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
(c) Are not presently indicted for or otherwise criminally or civilly charged by a federal, state or local governmental entity with commission of any of the offenses enumerated in paragraph (1)(b) of this certification;
(d) Have not within a three-year period preceding this application/proposal had one or more public (federal, state or local) transactions terminated for cause or default;
(e) Are registered and licensed in the State of Texas to perform the professional services which are necessary for the project; and
(f) Have not been disciplined or issued a formal reprimand by any State agency for professional accreditation within the past three years.

Name of Firm

Signature of Certifying Official | Title of Certifying Official

Printed Name of Certifying Official | Date

Where the Firm is unable to certify to any of the statements in this certification, such Firm shall attach an explanation to this certification.

SUBSCRIBED and sworn to before me the undersigned authority by

on this the day of , 20 , on behalf of said Firm.

Notary Public in and for the State of Texas

My commission expires:

SIGNATURE AND NOTARY NOT REQUIRED IF COMPLETING IN BIDSYNC ELECTRONICALLY.

DISCLOSURE OF LOBBYING ACTIVITIES

INSTRUCTIONS FOR COMPLETION OF FORM SF-LLL

This disclosure form shall be completed by the reporting entity, whether subawardee or prime Federal recipient at the initiation or receipt of a covered Federal action, or a material change to a previous filing, pursuant to title 31 U.S.C. section 1352. The filing of a form is required within 30 days of each payment or agreement to make payment to any lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a covered Federal action. Use the SF-LLL-A Continuation Sheet for additional information if the space on the form is inadequate. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identify the type of covered Federal action for which lobbying activity is and/or has been secured to influence the outcome of a covered Federal action.

2. Identify the status of the covered Federal action.

3. Identify the appropriate classification of this report. If this is a follow-up report caused by a material change to the information previously reported, enter the year and quarter in which the change occurred. Enter the date of the last previously submitted report by this reporting entity for this covered Federal action.

4. Enter the full name, address, city, state and zip code of the reporting entity. Include Congressional District, if known. Check the appropriate classification of the reporting entity that designates if it is, or expects to be, a prime or subaward recipient. Identify the tier of the sub-awardee, e.g., the first sub-awardee of the prime is the first tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.

5. If the organization filing the report in item 4 checks "Subawardee", then enter the full name, address, city, state and zip code of the prime Federal recipient. Include Congressional District, if known.

6. Enter the name of the federal agency making the award or loan commitment. Include at least one organizational level below agency name, if known. For example, Department of Transportation, United States Coast Guard.

7. Enter the Federal program name or description for the covered Federal action (item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans, and loan commitments.

8. Enter the most appropriate Federal identifying number available for the Federal action identified in item 1 [e.g., Request for Proposal (RFP) number: Invitation for Bid (IFB) number; grant announcement number; the contract, grant, or loan award number; the application/proposal control number assigned by the Federal agency]. Include prefixes, e.g., RFP-DE-90-001.

9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the Federal amount of the award/loan commitment for the prime entity identified in item 4 or 5.

10(a) Enter the full name, address, city, state and zip code of the lobbying entity engaged by the reporting entity identified in item 4 to influence the covered Federal action.

10(b) Enter the full names of the individual(s) performing services, and include full address if different from 10 (a). Enter Last Name, First Name, and Middle Initial (MI).

11. Enter the amount of compensation paid or reasonably expected to be paid by the reporting entity (item 4) to the lobbying entity (item 10). Indicate whether the payment has been made (actual) or will be made (Planned). Check all boxes that apply. If this is a material change report, enter the cumulative amount of payment made or planned to be made.

12. Check the appropriate box(es). Check all boxes that apply. If payment is made through an in-kind contribution, specify the nature and value of the in-kind payment.

13. Check the appropriate box(es). Check all boxes that apply. If other, specify nature.

14. Provide a specific and detailed description of the services that the lobbyist has performed, or will be expected to perform, and the date(s) of any services rendered. Include all preparatory and related activity, not just time spent in actual contact with Federal officials. Identify the Federal official(s) or employee(s) contacted or the officer(s), employee(s), or Member(s) of Congress that were contacted.

15. Check whether or not a SF-LLL-A Continuation Sheet(s) is attached.

16. The certifying official shall sign and date the form, print his/her name, title, and telephone number.

Public reporting burden for this collection of information is estimated to average 30 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0046), Washington, D.C. 20503.

Proposal References

List the last three (3) companies or governmental agencies, where the same or similar goods and/or services as contained in this RFP package, were recently provided by Respondent.

Reference 1

Client Name: Location:

Contact Name: Title:

Phone: E-mail

Contract Date To: Contract Date From: Contract Value: $

Scope of Work:

Reference 2

Client Name: Location:

Contact Name: Title:

Phone: E-mail

Contract Date To: Contract Date From: Contract Value: $

Scope of Work:

Reference 3

Client Name:

Location:

Contact Name:

Title:

Phone:

E-mail

Contract Date To:

Contract Date From:

Contract Value: $

Scope of Work:

Question and Answers for Bid #1705-166 - Williamson County Jail Kitchen & Plumbing Remodel

Overall Bid Questions
There are no questions associated with this bid.