



James E. Darling, Mayor

**Javier Villalobos,
Joaquin J. Zamora,
Tania Ramirez
J. Omar Quintanilla,
John Ingram,
Veronica Whitacre,**

**Commissioner – District 1
Commissioner – District 2
Commissioner – District 4
Commissioner – District 3
Commissioner – District 5
Commissioner – District 6**

Roel Rodriguez, P.E., City Manager

Yvette Barrera, P.E., CFM, City Engineer

Gerardo Noriega, CTPM, Director of Purchasing & Contracting

Bid, Form of Agreement, Bonds and Specifications for

**DEPARTMENT OF PUBLIC WORKS AUTOMOTIVE WAREHOUSE
EXPANSION AND ELEVATOR**

PROJECT NO. 07-19-C30-324

McAllen, Texas

DATED: JUNE 2019

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BID NOTICE

Solicitation Type and Name: Invitation to Bid for the Department of Public Works Automotive Warehouse Expansion and Elevator

Solicitation Number: 07-19-C30-324

Summary of Work: The work consists of expansion of an existing metal warehouse building with canopies and new elevator.

Bid Opening: Sealed electronic bids addressed to Mr. Roel “Roy” Rodriguez P.E., City Manager will be received until **Thursday, July 18, 2019 at 4:00 p.m., Central Standard Time (CST)** at which time they shall be publicly opened in a meeting held in McAllen City Hall, 2nd Floor, Conference Room 2A. All bid responses are only to be submitted **electronically** through the City of McAllen’s bidding portal: <https://mcallen.procureware.com>, on or before the aforementioned date and time. Original, hard copy, and/or late bids shall not be accepted.

Pre-Submittal Conference: City of McAllen, City Hall, Conference Room 2A, 1300 Houston Ave., McAllen, Texas 78501 on **Thursday, July 11, 2019 at 10:00 a.m. CST**. All prospective respondents are encouraged to be in attendance.

To view this solicitation, access Plans and Specifications, and submit a bid response, you must first register in the City’s bidding portal at <https://mcallen.procureware.com>. Solicitation documents will not be mailed, e-mailed, or provided in person. Once registered, you will also be added to the solicitation distribution list for changes and/or additions via Addenda form.

A Bidder’s Bond from a reliable surety company licensed to operate in the State of Texas or certified Cashier’s Check, (Bid Security) payable without recourse to the City of McAllen, for the amount of not less than five percent (5%) of the total bid shall be submitted via a sealed envelope as a guaranty that if awarded the contract, the bidder will enter into a contract with the City of McAllen. The Bidder’s bid security shall be submitted before the above-mentioned electronic bid opening date and time. Failure to submit the bid security shall be grounds for disqualification.

Bid Security shall be delivered in a sealed envelope and clearly marked as follows:

**BID SECURITY FOR PROJECT NO. 07-19-C30-324 DEPARTMENT OF PUBLIC WORKS
AUTOMOTIVE WAREHOUSE EXPANSION AND ELEVATOR**

Hand-deliver Bid Security or if using Land Courier (i.e., FedEx, UPS):

1300 Houston Avenue; Attn: Purchasing & Contracting Department; McAllen, Texas 78501

Mail Bid Security: P.O. Box 220, McAllen, TX 78505-0220

Potential bidders are asked to post their questions on our bidding portal under the tab labeled “Clarifications” under the relative project number.

The City of McAllen reserves the right to refuse and reject any or all Bids and to waive any or all formalities or technicalities, or to accept the Bid considered the best value to the City, and to hold the bids for a period of sixty (**60**) days without taking action.

Applicable Product Categories: 90930, 90922

CITY OF MCALLEN – PURCHASING & CONTRACTING DEPARTMENT

INFORMATION TO BIDDERS

1. SUBMITTAL OF BID

Sealed Bids shall be submitted electronically through the City of McAllen's bidding portal: <https://mcallen.procureware.com>. Each bid must be completely filled out and include all required supporting documentation. Bids submitted by facsimile (fax), original/hard-copies and/or late submittals will NOT be accepted. Submittal of a bid in response to this solicitation constitutes an offer by the Bidder, and if accepted by the City of McAllen, a contract. Bids which do not comply with these specifications may be rejected at the option of the City. Bids must be electronically received by the City of McAllen on or before the submittal deadline.

2. ELECTRONIC BID SUBMITTAL INSTRUCTIONS:

Bidders must go online to the City's Bidding Portal (<https://mcallen.procureware.com>) to submit bid response. Bidders are asked to read the Welcome Screen (PDF document) and register if they have not done so previously. Once on the bidding portal, follow the steps below to enter the electronic bid:

- I. Click on, "**Bids**" located on left-hand column.
- II. Find the applicable project and click the, "**Project Number**"
- III. Click on, "**Response**" tab.
- IV. In the "**Questions**" tab, upload required scanned documents into the bid portal by clicking "**Browse**" for each item.
- V. Click on, "**Pricing**" tab and enter a Unit Price for each pricing item. A "**Comment**" field is available if needed.
- VI. Once both the Questions and Pricing information has been entered, the yellow "**Question Response and Pricing Response**" information messages will change from incomplete to complete. Then the "**Submit**" button will become available.
- VII. Click "**Submit Bid**" button and review the terms and agreements Popup Window that appears. If you agree to the terms and conditions, click the "**I Accept and Submit this Bid**" button.
- VIII. If you want to remove your bid, click the red, "**Withdraw Bid**" button in the "**Response**" tab.

The City may consider non-responsive any bid not prepared and submitted in accordance with the provisions herein and may waive any formalities and/or technicalities, or reject any and all bids.

3. BID SECURITY (BID BONDS/CASHIER'S CHECK)

The bidder is specifically advised that the bid must be accompanied by a bid security in the form of a certified cashier's check or a bid bond from a reliable surety company licensed to operate in the State of Texas totaling five percent (5%) of the greatest amount bid, as a guaranty that if awarded the bid, the successful contractor will enter into a contract with the City of McAllen. The bid securities will be returned promptly after the successful contractor has entered into a contract with the City of McAllen. If no award has been made within sixty (60) days after opening of bids, bid securities will be returned accordingly.

Bid security must be submitted in a sealed envelope marked in the upper left hand corner with the name of Bidder and Title of Project.

Hand-deliver Bid Security or if using Land Courier (i.e., FedEx, UPS):

1300 Houston Avenue, Purchasing & Contracting Department (3rd Floor), McAllen, Texas 78501

Mail Bid Security: P.O. Box 220, McAllen, TX 78505-0220

INFORMATION TO BIDDERS continued:

4. PAYMENT AND PERFORMANCE BONDS

The successful contractor shall furnish a Payment Bond and Performance Bond in the amount of 100% of the contract sum, within ten (10) working days from letter of award of contract and upon the forms which are attached hereto. The Payment and Performance Bonds shall be from an approved surety company authorized to do business in the State of Texas (and acceptable according to the latest list of companies holding certificates of authority from the United States Department of the Treasury) and acceptable to Owner.

- 4.1 A Payment Bond is required if the Contract Sum is \$25,000 or over. The payment bond is to be for the Contract Sum and is payable to Owner solely for the protection and use of payment bond beneficiaries.

If the total contract sum is between \$25,000 and less than \$50,000, the successful contractor has the option to enter into a single payment contract with the City of McAllen in lieu of a Payment Bond, provided that no money shall be paid to the contractor until completion of the work by the contractor and acceptance of same by the City of McAllen.

- 4.2 A Performance Bond is required if the Contract Sum is \$50,000 or over. The performance bond is to be for the Contract Sum and is solely for the protection of Owner to guarantee the faithful performance of the Work in accordance with the Contract Documents. The performance bond shall be effective through Contractor's warranty period.

On all contracts that will equal to or exceed \$50,000.00, the performance bond and the payment bond must be provided from a surety that has a rating of "A" from AM BEST, MOODY'S or STANDARD & POORS.

5. BID FORMS

Bidders are advised that all bidders shall submit their bid utilizing only the forms that make up this bid package. Bids submitted utilizing other forms and/or formats will not be considered. If additional documents are required to be submitted as part of this solicitation, do not submit compressed (zip) files. Bidders must submit an electronic version of their bid through our bidding portal at <https://mcallen.procureware.com>.

6. PREPARATION OF BID

Bids MUST give full firm name and address of bidder and be manually or electronically signed. Failure to do so will disqualify your bid. Person signing bid must show title or AUTHORITY TO BIND HIS/HER FIRM IN A CONTRACT. Firm name and authorized signature must appear on each page that calls for this information. The legal status of the Bidder whether corporation, partnership, or individual, shall also be stated in the bid. A corporation shall execute the bid by its duly authorized officers in accordance with its corporate by-laws and shall also list the state in which it is incorporated. A partnership Bidder shall give full names and addresses of all partners. All partners shall execute the bid. Partnership and Individual Bidder shall state in the names and addresses of all persons with a vested interest therein. The place of residence of each Bidder, or the office address in the case of a firm or company with county and state and telephone number, shall be given after the signature.

7. ALTERATIONS/AMENDMENTS

Bids CANNOT be altered or amended after opening time. No bid may be withdrawn after opening time without acceptable reason in writing and only after approval by the City of McAllen.

INFORMATION TO BIDDERS continued:

8. SUBSTITUTIONS

No substitutions or cancellations shall be permitted without written approval by City of McAllen.

9. SALES TAX

The City of McAllen is exempt from all Federal Excise Tax and the State of Texas Limited Sales Excise and Use Tax. **STATE SALES TAX MUST NOT BE INCLUDED IN BID.**

10. NO BID RESPONSE

If unable to submit a bid, no further action is required by bidder. However, all bidders are encouraged to examine their selected categories and revise if necessary.

11. COSTS FOR PREPARATION OF BID

The City of McAllen shall not be held liable for any costs incurred by any bidder for work performed in the preparation of and production of a bid or for any work performed prior to execution of contract

12. FIRM PRICES

Unit prices for all items bid must be firm on bid opening date and continue to remain firm for the duration of the contract term. Bidders must make allowances for any and all peripheral costs associated with the Work. These allowances must be reflected in the unit prices bid per Work rendered. Bids having statements subject to unlimited price increase and/or addressing unknown charges above and beyond the unit prices quoted to the City of McAllen will not be considered and shall be looked upon as non-responsive. Bids submitted on the basis of “prices in effect at time of shipment, or with the potential of added costs based on market fluctuations and/or trends shall not be considered and shall be looked upon as non-responsive.

13. METHOD OF AWARD

Bidders are advised that the City of McAllen will award a Construction Contract based on “Lowest Responsive Responsible Bidder” meeting the requirements of the specifications. The City of McAllen may elect to award to the bidder who, in the opinion of the City of McAllen, is providing the best value for the City, as described in Local Government Code 252.043. All items will be evaluated and awarded individually or in any combination thereof. The City of McAllen’s decision shall be final.

14. CONTRACT TERMINATION CLAUSE

The parties agree that the City of McAllen reserves the right to terminate this contract in whole or in part, at any time, if in the opinion of the City of McAllen, the successful contractor’s performance is not acceptable, if the City is being repeatedly overcharged, improperly charged, or in the event that no funds are appropriated for this specific purpose, or if the City wishes, without cause, to discontinue/cancel this contract. If the City determines at the City’s sole discretion, that termination is in the City’s best interests, the City shall give written notice to the vendor/bidder/contractor of its intention to terminate, and the contract shall terminate after the expiration of thirty (30) days from the date of the written notice. After the expiration of the thirty (30) days and the termination of this contract, the City shall be relieved of any and all obligations and/or responsibilities arising from this contract including but not limited to the payment of any damages and/or penalties. Contractor shall be paid for products and/or services rendered and accepted in accordance with the contract for work performed up to the time of termination. In the event that funds are not made available from one budget year to the next, this contract will automatically become null and void without any penalty to the City of McAllen.

INFORMATION TO BIDDERS continued:

15. TIME ALLOWED FOR ACTION TAKEN

The City may hold the bids received for up to sixty **(60)** days after bid submittal deadline without taking action. Bidders shall be required to hold their bids firm for the same period of time.

16. RIGHT TO WAIVE

The City of McAllen reserves the right to waive or take exception to any part of these specifications when in the best interest of the City of McAllen.

17. RIGHT TO REJECT/AWARD

The City of McAllen reserves the right to refuse and reject any or all Bids, to waive any or all formalities or technicalities, and to make such awards of contract as may be deemed to be the best and most advantageous to the City of McAllen.

18. PAST PERFORMANCE

Bidders are advised that past performance, as it relates to product and/or service on Purchase/Service/Supply/Construction Contracts previously held with the City, shall be a factor in the evaluation and award of this Contract. Bidders that have not complied with their obligation(s) to the City of McAllen/McAllen Public Utility on previous projects will not be considered for award of this project. The City's position on this matter shall be final.

19. INTERPRETATIONS

Any questions concerning the conditions and/or specifications with regards to this solicitation for bids shall be directed to the designated individuals as outlined in the Invitation to Bid. Such interpretations, which may affect the eventual outcome of this Invitation to Bid, shall be furnished in writing to all prospective Bidders via Addendum. No interpretation shall be considered binding unless provided in writing by the City of McAllen in accordance with paragraph entitled "Addenda".

20. ADDENDA

Bidder shall carefully examine the solicitation documents, pricing forms, plans, specifications, visit the project site, and fully inform themselves as to all conditions and matters which can in any way affect the work or cost thereof. Should the bidder find discrepancies in, or omissions from pricing forms, solicitation documents, or other documents, or should bidder be in doubt as to their meaning, bidder should request clarification by posting their questions on the City's bidding portal under the tab labeled "Clarifications" under the applicable project number prior to submitting any bid. Explanations, interpretations, and supplemental instructions shall be in the form of written Addenda which shall become a part of the solicitation and contract documents. Said Addenda shall be posted in the bidding portal. All Addenda issued in respect to this project shall be considered official changes to the original solicitation documents. Verbal statements in response to inquiries and/or requests for explanations shall not be authoritative nor binding. It shall be the Bidder's responsibility to ensure that they have received all Addenda in respect to this project. Furthermore, bidders are advised that they must recognize, comply with, and attach a signed copy of each Addendum which shall be made part of their Bid Submittal. Bidder's signature on Addenda shall be interpreted as the respondent's "recognition and compliance to" official changes as outlined by the City of McAllen and as such are made part of the original solicitation documents. Failure of any bidder to receive any such addendum or interpretation shall not relieve such Contractor/Bidder from its terms and requirements. Addenda are available online at <https://mcallen.procureware.com>.

INFORMATION TO BIDDERS continued:

21. OMISSIONS

At the time of the submittal deadline, each bidder will be presumed to have read and to be thoroughly familiar with the requirements of the solicitation. The failure or omission of any bidder to examine any form, instrument, or contract document shall in no way relieve any bidder from any obligation in respect to their bid.

22. MATHEMATICAL ERRORS

In the event that mathematical errors exist in any bid, unit prices/rates -v- totals, unit prices/rates will govern.

23. HUB CERTIFICATION

State Certified “**HUB Vendor(s)**” are asked to provide a copy of their certification, if they have not previously done so. Information to be emailed to the following email address: bids@mcallen.net.

24. PUBLIC INFORMATION

All information, documentation, and other materials submitted in response to this solicitation are considered non-confidential and/or non-proprietary and are subject to public disclosure under the Texas Public Information Act (Texas Government Code, Chapter 552.001, et seq.) after the solicitation is completed. Any information deemed to be confidential by the bidder, including trade secrets, should be clearly noted on the pages where confidential information is contained.

25. STATUTORY REQUIREMENTS

It shall be the responsibility of the successful Bidder to comply with all applicable State & Federal laws, Executive Orders and Municipal Ordinances, and the Rules and Regulations of all authorities having jurisdiction over the work to be performed hereunder and such shall apply to the contract throughout, and that they will be deemed to be included in the contract as though written out in full in the contract documents. (To include issues related to health, environmental, and safety to name a few.)

26. ANTI-LOBBYING PROVISION

During the period between bid submission date and the contract award, bidders, including their agents and representatives, shall not directly discuss or promote, verbal or written, their bid with any member of the City Commission, Board members directly or indirectly through others, seek to influence any City Council member, City staff, or City’s Contractor(s) regarding any matters pertaining to this solicitation, except as herein provided. If a representative of any Bidder violates the foregoing prohibition by contacting any of the above listed parties with whom contact is not authorized, such contact may result in the Bidder being disqualified from the procurement process. Any oral communications are considered unofficial and non-binding with regard to this solicitation. Violation of this provision may result in the rejection of the bidder's bid, except in the course of City-sponsored inquiries, briefings, interviews, or presentations.

27. ANTI-COLLUSION STATEMENT

The respondent shall submit a Non-Collusion affidavit affirming that the bidder has not in any way directly or indirectly, colluded, conspired, or agreed with any other person, firm, corporation, respondent or potential respondent to the amount of this bid or the terms or conditions of this bid. Paid or agreed to pay any other person, firm, corporation respondent or potential respondent any money or anything of value in return for assistance in procuring or attempting to procure a contract or in return for establishing the prices in the submitted bid or the bid of any other respondent.

INFORMATION TO BIDDERS continued:

28. CONFLICT OF INTEREST

CHAPTER 176 OF THE TEXAS LOCAL GOVERNMENT CODE

Effective January 1, 2006, Chapter 176 of the Texas Local Government Code requires that any vendor or person considering doing business with a local government entity disclose in the Questionnaire Form CIQ, the vendor or person's affiliation or business relationship that might cause a conflict of interest with a local government entity. By law, this questionnaire must be filed with the records administrator of the City of McAllen not later than the seventh (7th) business day after the date the person becomes aware of facts that require the statement be filed. See Section 176.006, Local Government Code.

A person commits an offense if the person violates an offense under this section is a Class C misdemeanor.

For more information or to obtain Questionnaire CIQ go to the Texas Ethics Commission web page at www.ethics.state.tx.us/forms/CIQ.pdf.

IF YOU HAVE ANY QUESTIONS ABOUT COMPLIANCE, PLEASE CONSULT YOUR OWN LEGAL COUNSEL. COMPLIANCE IS THE INDIVIDUAL RESPONSIBILITY OF EACH PERSON OR AGENT OF A PERSON WHO IS SUBJECT TO THE FILING REQUIREMENT. AN OFFENSE UNDER CHAPTER 176 IS A CLASS "C" MISDEMEANOR.

29. HOUSE BILL (HB) 1295 (Certificate of Interested Parties – Form 1295)

Please be advised that in 2015, the Texas Legislature adopted House Bill 1295 (H.B. 1295). For contracts entered into on or after January 1, 2016, Texas Government Code Chapter §2252.908 (H.B. 1295) provides that a Texas governmental entity or state agency may not enter into a contract that either (1) requires an action or vote by the governing body of the entity or agency or (2) has a value of at least \$1 million, unless the business entity submits a disclosure of interested parties to the governmental entity or state agency at the time the business entity submits the signed contract to the governmental entity or state agency. The Texas Ethics Commission (Commission) has adopted a certificate of interested parties form (Form 1295) and adopted rules requiring the business entity to file Form 1295 electronically with the Commission. Information from the Commission regarding the requirements, including rules and filing information, are available on the Commission's website at the following links:

<https://www.ethics.state.tx.us/tec/1295-Info.htm>

https://www.ethics.state.tx.us/whatsnew/FAQ_Form1295.html

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

As a business entity under this law, it is your firm's responsibility to comply with all disclosure laws including Chapter 2252. The City of McAllen, as the governmental entity, must ensure compliance of the same.

Note: You will be required to register and create an account. Once registered, you will receive an email containing a password setup link. Click on the link to set your password. After you have established an account, you will use your email address, password, and user type (Business Entity) to log in to the filing application to enter the required information on Form 1295. Print a copy of the completed form which includes a unique certification of filing number assigned by the application. An authorized agent of the business entity must sign the form affirming under the penalty of perjury that the completed form is true and correct. The completed, printed, and signed Form 1295 bearing the unique certification of filing number must be submitted at the time the signed contract is submitted to the City of McAllen/McAllen Public Utility. Failure to comply may result in contract revocation and award to the next compliant contractor/vendor.

INFORMATION TO BIDDERS continued:

30. DISCLAIMER

While all precautions have been taken to ensure that documents on the bidding portal will not interfere with or cause damage to your system or its existing data, the City of McAllen accepts no responsibility for damages that may be caused by these documents and makes no other warranty or representation, neither expressed nor implied, with respect to these documents. These documents are provided “as is” and you, the user, assume the entire risk when you use them.

31. LIMITATION OF LIABILITY

Vendors that use the services available through the bidding portal agree that the City of McAllen shall not be liable for any loss of profits, loss of time, interruption of business, or indirect, special, incidental, or consequential damages of any kind whether under this agreement or otherwise due to vendor’s use of this system.

32. WAIVER

Due to the electronic transmissions, the City of McAllen does not guarantee nor will it be liable for the accuracy of what is read or what is downloaded.

33. NON-APPROPRIATION CLAUSE

In the event that no funds are appropriated for this specific work, the City of McAllen reserves the right to cancel/terminate this contract. The City of McAllen shall be relieved of any and all responsibilities and/or obligations, without penalty(ies) of any sort. The vendor shall be notified in written form of the City of McAllen’s intent to cancel/terminate said contract due to non-appropriated funds.

34. NON-DISCRIMINATION/DRUG FREE

The successful Respondent will comply with all federal and state requirements concerning fair employment and will not discriminate by reason of race, color, age, religion, sex, national origin or physical handicap. The successful Respondent shall provide evidence in form and substance, to the City of McAllen of maintaining a drug free working environment.

35. MINORITY AND WOMEN-OWNED BUSINESS ENTERPRISES (MWBE)

The City of McAllen encourages the hiring and participation by MWBEs in the performance of the contract.

36. INSURANCE REQUIREMENTS

During execution of Contracts, the successful Prime Contractor shall provide a Certificate of Insurance made to the City of McAllen, P.O. Box 220, McAllen, TX 78505-0220, (1300 Houston, McAllen, Texas 78501) and should reference the project number and project Name. The prime contractor shall ensure that any and all subcontractors and/or lower-tier subcontractors comply with the insurance requirements as depicted herein. Such coverage(s) shall be acquired and maintained, for the duration of the contract period. (See Section 28. Insurance Requirements of the General Conditions of Contract for additional information.)

END OF SECTION

BID FORM
PROJECT NO. 07-19-C30-324
DEPARTMENT OF PUBLIC WORKS AUTOMOTIVE WAREHOUSE
EXPANSION AND ELEVATOR

TO: OWNER

The undersigned, as bidder, declares that the only person or parties interested in this bid as principals are those named herein and that this bid is made without collusion with any other person, firm or corporation; the bidder has carefully examined the Bid Notice, Information to Bidders, Form of Agreement, General and Supplemental General Conditions, Special Provisions, Technical specifications and the plans thereon referred to and has carefully examined the locations, conditions, and classes of materials of the proposed work; and Bidder agrees that if awarded the Contract, bidder shall provide all the necessary labor, machinery, tools, apparatus, and other items incidental to construction, and will do all the work and furnish all the materials called for in the contract and specifications in the manner prescribed therein and according to the requirements of the Engineer/Architect as therein set forth.

It is understood that the following quantities of work to be done at unit prices are approximate only and are intended principally to serve as a guide in evaluating bids.

It is further agreed that the quantities of work to be done at unit price and materials to be furnished, may be increased or diminished as may be considered necessary, in the opinion of the Engineer/Architect, to complete the work fully as planned and contemplated, and that all quantities of the work, whether increased or decreased, are to be performed at the unit prices set forth below except as provided for in the specifications.

It is further agreed that lump sum prices may be increased to cover additional work ordered by the Engineer/Architect, but not shown on the plans or required by the specifications, in accordance with the provisions of the General Conditions. Similarly, they may be decreased to cover deletion of work so ordered.

The undersigned agrees, unless hereinafter stated otherwise to furnish all materials as shown and specified in the Plans and Specifications.

A bid security in the amount of five percent (5%) of the Total Bid must be submitted in compliance with the Information to Bidders.

It is understood that in the event the successful bidder fails to enter into the Form of Agreement and/or furnish an acceptable Payment and Performance Bond, each in the amount of one hundred percent (100 %) of the Contract Sum, within ten (10) working days of the Letter of Award, the successful bidder shall forfeit the bid security and the bid security shall become the property of the City of McAllen, TX.

It is understood that the City may consider non-responsive any bid not prepared and submitted in accordance with the provisions herein and may waive any formalities and/or

BID FORM Continued:

*The following table describes the bid items and quantities reflected on the official bid form maintained on the City's bidding web portal. Do not enter bid amount in this table. Refer to the Information to Bidders (Page B-1) for instructions on how to submit electronic sealed bids. **(BIDDERS ARE ASKED TO CHECK THEIR BID AMOUNT SUBMITTALS IN AN EFFORT TO AVOID DISCREPANCIES).***

BID ITEM DESCRIPTION AND QUANTITIES APPROXIMATE ONLY:

Item No.	Internal Reference No.	Type	Description	Unit of Measure	Quantity
1	90922	BASE	PUBLIC WORKS AUTOMOTIVE WAREHOUSE EXPANSION AND ELEVATOR	LS	1

Bidder hereby agrees to commence work under this contract within ten (10) working days after Notice to Proceed is issued by the City.

Bidder hereby agrees to complete work within _____ (_____) working days. **Number of days to complete work shall not exceed one hundred-twenty (120) working days.**

DATE: _____

Respectfully submitted,

BY: _____
(Signature)

(Type or Print Name of Authorized Signer)

(Title)

(Legal Company Name)

(Address)

(Phone Number)

(Fax Number)

(E-Mail)

(Seal - If bidder is a Corporation)

SUPPLEMENT NO. 1 TO BID FORM: NON-RESIDENT BIDDER

NON-RESIDENT BIDDER: Non-resident bidder is a bidder whose principal place of business is not in the State of Texas, but excludes a contractor whose ultimate parent company or majority owner has its principal place of business in the State of Texas.

Nonresident Bidder: Yes _____ No _____

If yes, does your state have a preference law?

Yes _____ No _____

Percent (%) of preference _____

(Date)

(Type or Print Name)

(Title)

(Company)

(Address)

(Phone Number)

(Fax Number)

SUPPLEMENT NO. 2 TO BID FORM: BOND INFORMATION

(Form to be Executed & Submitted with Bid)

On all contracts that will equal to or exceed \$50,000.00, the Performance Bond and the Payment Bond must be provided from a surety that has rating of "A" from AM BEST, MOODY'S STANDARD & POORS.

MAIN COMPANY

AGENT'S NAME: _____
PLEASE TYPE/PRINT NAME

COMPANY NAME: _____

ADDRESS: _____

**MAIN OFFICE
TELEPHONE NO.:** _____

LOCAL COMPANY

AGENT'S NAME: _____
PLEASE TYPE/PRINT NAME

COMPANY NAME: _____

ADDRESS: _____

**LOCAL MAIN OFFICE
TELEPHONE NO.:** _____

PROJECT NO.: _____

PROJECT NAME: _____

CONTRACTOR: _____
SIGNATURE

PLEASE TYPE/PRINT NAME

COMPANY NAME

SUPPLEMENT NO. 3 TO BID FORM: NON-COLLUSION AFFIDAVIT

STATE OF _____

COUNTY OF _____

_____, of lawful age, being first duly sworn, on oath says, that (s)he is the agent authorized by the bidder to submit the attached bid. Affiant further states that the respondent/bidder has not been a party to any collusion among bidders in restraint of freedom of competition by agreement to purpose at a fixed price or to refrain from proposing; or with any state official, city employee, Board Trustee, or benefit consultant as to quantity, quality, or price in the prospective contract, or any other terms of said prospective contract; or in any discussions or actions between bidders, city employee, Board Trustee, or benefit consultant concerning exchange of money or other things of value for special consideration in the letting of this contract.

Signature

Subscribed and sworn to before me this _____ day of _____, 201__.

Notary Public

State of _____

My Commission Expires: _____

SPECIAL PROVISIONS

Specifications which Apply

All work under this contract shall conform to the requirements of these specifications.

In cases where the standard specifications are in conflict with either Plans and Specifications or the Special Provisions, the order of supersedence shall be Special Provisions and Plans and Specifications.

All labor, materials, equipment, supervision and other services required for this construction will be furnished in accordance with plans and specifications as prepared by Negrete & Kolar Architects, LLP.

City of McAllen has delineated work areas and access routes. Any damaged property not otherwise mentioned within plans or specifications to be installed, shall be the responsibility of the contractor (product and installation) as approved by City of McAllen.

The City of McAllen is a franchised area for sanitation and debris removal. Materials and debris can be disposed of by means of a dump truck or pickup truck. Should a roll-off container be needed due to the amount discarded a roll-off container would need to be set up through the City of McAllen Public Works Department (956-681-4050). Outside roll-off companies are not permitted on city projects.

Where conflicts occur between the drawings and specifications, between different drawings, between different portions of this section of the specifications, or between different sections of the specifications, the more stringent requirements and the greater quantity shall apply.

Security Measures

A contractor's superintendent shall be on the job at all times that construction workers are present at the construction site.

Testing

The owner reserves the option of testing any and all materials used in this construction. All testing will be made by an independent laboratory designated and paid by the owner, unless otherwise stated in the specifications of the items to be tested. Any costs associated with retesting of materials shall be the responsibility of the contractor as required by the City of McAllen. Any construction materials not meeting specifications may be rejected at contractor's expense or may be accepted by the city provided a deduction is granted. The Engineering Department must be notified 24 hours in advance of materials testing.

Schedule and Sequence of Construction

The Contractor shall, prior to beginning work, prepare and submit a proposed schedule of work to the Owner for his approval. Work schedule to be planned in coordination with Zef Mendoza, Engineering Department personnel and performed such that there is minimal interference to Department of Public Works Automotive Warehouse. Recommended construction hours are between the hours of 7:00am. to 6:00 pm.

SPECIAL PROVISIONS Continued:

Utilities

Contractor to provide for his own utility requirements.

Building Permit and Taxes

A building permit will be required for the construction of this project. Contractor is responsible for obtaining permit and any related fees.

Inspection of Work

The Owner will provide sufficient competent personnel for the inspection of the work while such work is in progress to ascertain that the completed work will comply in all respects with the standards and requirements set forth in the Specifications. Contractor will be responsible for payment of city inspection personnel if major work related issues are scheduled outside of the normal business hours, as is required by the City of McAllen. Not with standing such inspection, the Contractor will be held responsible for the acceptability of the finished work.

Owner's representatives shall at all times have access to the work whenever it is in preparation or progress, and the Contractor shall provide proper facilities for such access, and for inspection.

If the Specifications, the Engineer's instructions, laws, ordinances, or any public authority require any work to be specially tested or approved, the Contractor shall give the Engineer timely notice of its readiness for inspection. Inspections by the Engineer shall be made promptly, and where practicable at the source of supply. If any work should be covered up without approval or consent of the Architect/Engineer, it must be uncovered at the Contractor's expense, unless the Architect/Engineer has unreasonably delayed inspection.

Re-examination of the work may be ordered by the Architect/Engineer and, if so ordered, the work must be uncovered by the Contractor. If such work is found to be in accordance with the Contract Documents, the Owner shall pay the cost of re-examination and replacement. If such work is not in accordance with the Contract Documents, the Contractor shall pay such cost.

Changes in the Work

The Owner may make changes in the Drawings and Specifications of scheduling of the Contract within the general scope at any time by a written order. If such changes, add to or deduct from the contractor's cost of the work, the Contract shall be adjusted accordingly. All such work shall be executed under the conditions of the original Contract except that any claim for extension of time caused thereby shall be adjusted at the time of ordering such change. In giving instructions, the Engineer shall have authority to make minor changes in the work not involving cost, and not inconsistent with the purposes of the work, but otherwise, except in an emergency endangering life or property, no extra work or change shall be made unless in pursuance of a written order by the Architect/Engineer, an no claim for an addition to the Contract Sum shall be valid unless the additional work was so ordered.

SPECIAL PROVISIONS Continued:

Competency of Bidders

The Bidder must be capable of performing each of the various items of work bid upon. Upon request, the successful Bidder shall submit a complete statement of his financial resources and his previous experience in similar work.

Guarantee of Work

All workmanship, equipment and materials, furnished or installed by the Contractor shall be guaranteed for a period of at least one (1) year against faulty workmanship or defective materials. The warranty period shall begin on the date of substantial completion and acceptance of the project by the Owner and extend for a period of 365 days thereafter. Warranty Periods on punch list items shall begin when items are approved as corrected.

Maintenance Support

Within ten days of the date of Substantial Completion of the project, deliver to the Owner three copies of the manufacturer's printed instructions regarding care and maintenance of the roof.

Final Clean Up

At the end of each day's work session contractor shall clean the premises, remove all construction debris and leave the Public Works site in a condition that daily work activities can proceed. Remove all trash, surplus and discarded materials, temporary services, materials and debris of every kind. The Contractor shall leave the site of the work in a neat and orderly condition equal to that which originally existed. Waste materials removed from the site shall be disposed of and secured at locations satisfactory to the City Of McAllen and shall be considered incidental to the bid.

Correction of Work Before Final Payment

The Contractor shall promptly remove from the premises all materials and work condemned by the Owner/Designer as failing to meet Contract requirements, whether incorporated in the work or not. The Contractor shall promptly replace and re-execute his own work in accordance with the Contract and without expense to the Owner and shall bear the expense of making good all work of other contractors destroyed or damaged by such removal or replacement.

If the Contractor does not take action to remove such condemned materials and work within 10 days after written notice, the Owner may remove them and may store the material at the expense of the Contractor. If the Contractor does not pay the expense of such removal and storage within ten days' time thereafter, the Owner may, upon ten days', written notice, sell such materials at auction or at private sale and shall pay the Contractor any net proceeds thereof, after deducting all the costs and expenses that should have been borne by the Contractor.

FORM OF AGREEMENT FOR ENGINEERING/ARCHITECTURAL CONSTRUCTION

This Agreement is made as of _____, 20_____, (the “Effective Date”) by and between

The Owner: The City of McAllen, acting herein through the Board of Commission

and Contractor: _____

for the Project: DEPARTMENT OF PUBLIC WORKS AUTOMOTIVE WAREHOUSE
EXPANSION AND ELEVATOR

Project Number: 07-19-C30-324

The Owner and the Contractor agree as follows:

ARTICLE 1. SCOPE OF THE WORK

The Contractor hereby agrees to furnish all of the materials and all of the equipment and labor necessary and to perform all of the Work in accordance with the Owner’s requirements and as shown on the drawings and described in the specifications for the project entitled **DEPARTMENT OF PUBLIC WORKS AUTOMOTIVE WAREHOUSE EXPANSION AND ELEVATOR; PROJECT NO: 07-19-C30-324.**

ARTICLE 2. CONTRACT DOCUMENTS

The Contract Documents consist of:

- a. This Form of Agreement and all exhibits and attachments listed, contained or referenced in this Agreement;
- b. Special Provisions
- c. General Conditions of Contract for Engineering/Architectural Construction
- d. Supplemental General Conditions of Contract for Engineering/Architectural Construction
- e. *Reserved*
- f. All Addenda issued before the Effective Date of this Agreement;
- g. All Alternate Bids accepted by the Owner before the Effective Date of this Agreement;
- h. All Change Orders issued after the Effective Date of this Agreement;
- i. Drawings, Specifications, details and other documents developed by Owner and/or Project Architect to describe the Project and accepted by Owner
- j. Drawings and Specifications developed or prepared by Owner’s other consultants, if any, and accepted by Owner
- k. Contractor’s Bid. To the extent of any conflict between Contractor’s Bid and any other Contract Document, the Contract Document shall govern.
- l. Solicitation Documents.

The Contract Documents form the entire and integrated Contract between Owner and Contractor and supersede all prior negotiations, representations or agreements, written or oral.

FORM OF AGREEMENT continued:

ARTICLE 3. CONTRACT SUM

The Owner shall pay the Contractor for performance of the Contract, including the Base Bid and Alternate Bid, the sum of _____ (\$_____), and make payment on account as provided in the General Conditions of Contract for Engineering/Architectural Construction.

ARTICLE 4. TIME OF COMPLETION

The Owner shall issue a Notice to Proceed identifying the date for commencement of the Work. The commencement date shall be ten (10) working days after the date the notice is issued. The Contractor shall achieve completion of the Work within _____ () working days after the commencement date, as such completion date may be extended by approved Change Orders.

ARTICLE 5. LIQUIDATED DAMAGES

The time set forth in the bid for the completion of the work is an essential element of the contract. For each consecutive working day after the expiration of the completion date set forth in the Notice to Proceed that any incomplete Work prevents or impairs the Owner's ability to operate and use the Project for its intended purposes, including the correction of deficiencies found during the final testing and inspection, the following amounts shall be deducted from the money due or that becomes due to the Contractor, not as a penalty, but as liquidated damages representing added expense for Engineering/Architectural supervision.

CONTRACT SUM	LIQUIDATED DAMAGES COST PER DAY
\$5,000.00 to \$25,000.00	\$100.00
\$25,001.00 to \$100,000.00	\$200.00
\$100,001.00 to \$500,000.00	\$250.00
\$500,001.00 and over	\$300.00

ARTICLE 6. BONDS AND INSURANCE

The Contractor shall provide performance and payment bonds on forms prescribed by Owner and in accordance with the requirements set forth in the General Conditions of Contract for Engineering/Architectural Construction. The penal sum of the payment and performance bonds shall be equal to the Contract Sum.

The Contractor shall not commence work under the Agreement until it has obtained all insurance coverage as required by the General Conditions of Contract and until evidence of the required insurance has been reviewed and approved by the Owner. Owner's review of the insurance shall not relieve nor decrease the liability of the Contractor.

ARTICLE 7. CONTRACTOR'S SPECIAL WARRANTIES AND RESPONSIBILITIES

7.1 Contractor agrees and acknowledges that Owner is entering into this Agreement in reliance on Contractor's represented expertise and ability to provide construction services. Contractor agrees to use its best efforts, skill, judgment, and abilities to perform its obligations and to further the interests of Owner in accordance with Owner's requirements and procedures.

FORM OF AGREEMENT continued:

7.2 Contractor represents and agrees that it will perform its services in accordance with the usual and customary standards of Contractor's profession or business and in compliance with all applicable national, federal, state, and municipal, laws, regulations, codes, ordinances, orders and with those of any other body having jurisdiction over the Project.

7.3 Contractor agrees to bear the full cost of correcting Contractor's negligent or improper work and services, those of its consultants, and any harm caused by the negligent or improper work or services.

7.4 Contractor's duties shall not be diminished by any approval by Owner nor shall the Contractor be released from any liability by any approval by Owner, it being understood that the Owner is ultimately relying upon the Contractor's skill and knowledge in performing the services required by this Agreement.

7.5 Contractor represents and agrees that all persons connected with the Contractor directly in charge of its services are duly registered and/or licensed under the laws, rules and regulations of any authority having jurisdiction over the Project if registration is required.

7.6 Contractor represents and agrees to advise Owner of anything of any nature in any drawings, specifications, plans, sketches, instructions, information, requirements, procedures, and other data supplied to the Contractor (by the Owner or any other party) that is, in its opinion, unsuitable, improper, or inaccurate for the purposes for which the document or data is furnished.

7.7 The Contractor represents and agrees to perform its services under this Agreement in an expeditious and economical manner consistent with good business practices and the interests of Owner.

7.8 Contractor represents and agrees that there are no obligations, commitments, or impediments of any kind that will limit or prevent performance of its obligations under this Agreement.

7.9 Contractor represents and agrees that the individual executing this Agreement on behalf of Contractor has been duly authorized to act for and to bind Contractor to its terms.

7.10 Contractor shall designate a representative authorized to act on Contractor's behalf with respect to the Project.

7.11 Contractor shall establish and maintain a numbering and tracking system for all Project records including, but not limited to, changes, requests for information, submittals, and supplementary instructions and shall provide updated records to the Owner when requested.

7.12 Except for the obligation of Owner to pay Contractor certain fees, costs, and expenses pursuant to the terms of this Agreement, Owner shall have no liability to Contractor or to anyone claiming through or under Contractor by reason of the execution or performance of this Agreement. Notwithstanding any obligation or liability of Owner to Contractor, no present or future partner or affiliate of Owner or any agent, officer, director, employee, or City Official of Owner, or of the components comprising the City of McAllen, or anyone claiming under Owner has or shall have any personal liability to Contractor or to anyone claiming through or under Contractor by reason of the execution or performance of this Agreement.

FORM OF AGREEMENT continued:

ARTICLE 8. Party Representatives

8.1 The Owner's Designated Representative (ODR) authorized to act in the Owner's behalf with respect to the Project is:

City of McAllen Engineering Department:
Yvette Barrera, PE, CFM, City Engineer
(956) 681-1151

Name, Title
Contact Phone Number

8.2 The Contractor's designated representative authorized to act on the Contractor's behalf and bind the Contractor with respect to the Project is:

Company Name
Contact name and Title
Phone number
Email Address

8.3 The parties may make reasonable changes in their designated representatives upon advance written notice to the other party.

ARTICLE 9. NOTICES

Notices of claims or disputes or other legal notices required by this Agreement shall be sent to the following persons at the indicated locations.

If to Owner: Gerardo Noriega, CTPM, Director of Purchasing & Contracting
1300 Houston Avenue, Purchasing & Contracting Department
McAllen, Texas 78501
Mailing: P.O. Box 220, McAllen, TX 78505-0220
Email: gnoriega@mcallen.net
Fax No. (956) 681-1138

If to Contractor: *Company Name*
Contact name and Title
Address
Email Address
Fax No.

The parties may make reasonable changes in the person or place designated for receipt of notices upon advance written notice to the other party.

FORM OF AGREEMENT continued:

IN WITNESS WHEREOF the parties hereto have executed this Agreement, the day and year first above written.

(Contractor)

(CORPORATE SEAL)

WITNESS:

LEGAL COMPANY NAME

By: _____
Signature

Name and Title of Authorized Representative
(Type/Print)

CITY OF McALLEN
(Owner)

By: _____
GERARDO NORIEGA, CTPM,
DIRECTOR PURCHASING & CONTRACTING

By: _____
ROEL "ROY" RODRIGUEZ, P.E.,
CITY MANAGER

PERFORMANCE BOND

STATUTORY PERFORMANCE BOND PURSUANT TO ARTICLE 2253
OF THE TEXAS LOCAL GOVERNMENT CODE AS AMENDED BY ACTS OF THE 1993,
73RD LEGISLATURE, CH. 268, § 1, EFF. SEPT. 1, 1993, AMENDED BY ACTS 1999, 76TH
LEGISLATURE, CH. 62, SECTION 8.20, EFF. SEPT. 1, 1999

KNOW ALL MEN BY THESE PRESENTS, THAT _____

(hereinafter called the Principal(s), as Principal(s), and _____

(hereinafter called the Surety(s), as Surety(s), are held and firmly bound unto _____

(hereinafter called the Oblige), in the amount of _____

_____ Dollars (\$_____)

for the payment whereof the said Principal and Surety bind themselves, and their heirs,

administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written contract with the Oblige, dated the

_____ day of _____, 20_____, for the _____

which contract is hereby referred to and made a part hereof as fully and to the same extent as if
copies at length herein.

PERFORMANCE BOND Continued:

NOW THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal shall faithfully perform the work in accordance with plans, specifications and contract documents, during the original term of said contract and any extension thereof that may be granted by the City of McAllen with or without notice to the surety and during the life of any guaranty required under the contract, and shall also truly perform and fulfill all the undertakings, covenants, terms, conditions and agreements of any and all authorized modifications of said contract that may hereafter be made, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Statutory Performance Bond Pursuant To Article 2253 of the Texas Local Government Code as Amended by Acts of the 1993, 73rd Legislature, Ch. 268, § 1, Eff. Sept. 1, 1993, Amended By Acts 1999, 76th Legislature, Ch. 62, Section 8.20, Eff. Sept. 1, 1999, and all liabilities on this bond shall be determined in accordance with the provisions of said Article to the same extent as if it were copied at length herein.

IN WITNESS WHEREOF, this instrument is executed in five counterparts, each one of which shall be deemed an original, this the _____ day of _____ A.D., 20____.

ATTEST:

Principal

(Principal) Secretary
(SEAL)

Signature

Witness as to Principal

(Print/Type Name)

(Address)

(Address)

ATTEST:

Surety

(Surety) Secretary
(SEAL)

Attorney-in-Fact (Signature)

Witness as to Surety

(Print/Type Name)

(Address)

(Address)

NOTE: Date of Bond must not be prior to date of Contract (1) Correct name of Contractor; (2) A Corporation, a Partnership or an Individual, as case may be; (3) Correct name of Surety; (4) Correct name of Owner; (5) County or Parish and State; (6) Owner; (7) If Contractor is Partnership, all partners should execute bond.

PAYMENT BOND

STATUTORY PAYMENT BOND PURSUANT TO ARTICLE 2253
OF THE TEXAS LOCAL GOVERNMENT CODE AS AMENDED BY ACTS OF THE 1993,
73RD LEGISLATURE, CH. 268, § 1, EFF. SEPT. 1, 1993, AMENDED BY ACTS 1999, 76TH
LEGISLATURE, CH. 62, SECTION 8.20, EFF. SEPT. 1, 1999

KNOW ALL MEN BY THESE PRESENTS, that _____

(hereinafter called the Principal(s), as Principal(s), and _____

(hereinafter called the Surety(s), as Surety(s), are held and firmly bond unto _____

(hereinafter called the Oblige(e)), in the amount of _____

_____ Dollars (\$_____)

for the payment whereof, the said Principal and Surety bind themselves, and their heirs,
administrators, executors, successors and assigns, jointly severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written contract with the Oblige(e),

dated the _____ day of _____, 20_____, to which contract is hereby

referred to and made a part hereof as fully and to the same extent as if copies at length herein.

P A Y M E N T B O N D Continued:

NOW THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal shall pay all claimants supplying labor and material to him or a subcontractor in the prosecution of the work provided for in said contract, and any extension thereof that may be granted by the City of McAllen with or without notice to the surety and during the life of any guaranty required under the contract, and shall also truly perform and fulfill all the undertakings, covenants, terms, conditions and agreements of any and all authorized modifications of said contract that may hereafter be made, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Statutory Payment Bond Pursuant To Article 2253 of the Texas Local Government Code as Amended by Acts of the 1993, 73rd Legislature, Ch. 268, § 1, Eff. Sept. 1, 1993, Amended By Acts 1999, 76th Legislature, Ch. 62, Section 8.20, Eff. Sept. 1, 1999, and all liabilities on this bond shall be determined in accordance with the provisions of said Article to the same extent as if it were copied at length herein.

IN WITNESS WHEREOF, this instrument is executed in five counterparts, each one of which shall be deemed an original, this the _____ day of _____ A.D., 20_____.

	_____ Principal
ATTEST:	
_____ (Principal) Secretary (SEAL)	_____ Signature
_____ Witness as to Principal	_____ (Print/Type Name)
_____ (Address)	_____ (Address)
ATTEST: _____	_____ Surety
_____ (Surety) Secretary (SEAL)	_____ Attorney-in-Fact (Signature)
_____ Witness as to Surety	_____ (Print/Type Name)
_____ (Address)	_____ (Address)

NOTE: Date of Bond must not be prior to date of Contract

- (1) Correct name of Contractor; (2) A Corporation, a Partnership or an Individual, as case may be; (3) Correct name of Surety; (4) Correct name of Owner; (5) County or Parish and State; (6) Owner; (7) If Contractor is Partnership, all partners should execute bond.

GENERAL CONDITIONS OF CONTRACT FOR ENGINEERING/ARCHITECTURAL CONSTRUCTION

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GENERAL CONDITIONS OF CONTRACT FOR ENGINEERING/ARCHITECTURAL CONSTRUCTION

SECTION 1. DEFINITIONS

1.1 The *Contract Documents* shall consist of Form of Agreement and all exhibits and attachments listed, contained or referenced in the Agreement; Special Provisions; General and Supplemental Conditions of Contract for Engineering/Architectural Construction; All Addenda issued before the Effective Date of the Agreement; All Alternate Bids accepted by the Owner before the Effective Date of the Agreement; All Change Orders issued after the Effective Date of the Agreement; Drawings, Specifications, details and other documents developed by Owner and/or Project Architect to describe the Project and accepted by Owner; Drawings and Specifications developed or prepared by Owner's other consultants, if any, and accepted by Owner; and Contractor's Bid.

1.2 The *Owner* shall represent the City of McAllen.

1.3 *Contractor* means the individual, corporation, limited liability company, partnership, firm, or other entity contracted to perform the Work, regardless of the type of construction contract used, so that the term as used herein includes general or prime Contractor. The Contract Documents refer to Contractor as if singular in number.

1.4 Wherever in this contract the word "*Engineer/Architect*" is used it shall be understood as referring to the Engineer/Architect of the Owner, acting personally or through assistants duly authorized in writing by the Engineer/Architect.

1.5 *Subcontractor* shall mean anyone (other than the Contractor) who furnished at the site, under an Agreement with the Contractor, labor, materials, or equipment, or a combination thereof, but shall not include any person who furnishes services of a personal nature.

1.6 *Work* shall mean the furnishing of all labor, materials, equipment, and other incidentals as are required to complete the Project for the purpose for which it was intended

1.7 *Dispute* shall mean lack of agreement between any parties that have any obligations, duties, or responsibilities under the terms of the contract, Drawings, or Specifications.

1.8 *Written notice* shall be deemed to have been duly served if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or to an authorized representative of such individual, firm, or corporation, or if delivered at or sent by registered mail to the last business address known to him who gives the notice, with a copy sent to the central office of the contractor.

SECTION 2. COPIES OF DRAWINGS FURNISHED

Unless otherwise provided in the Contract Documents, the Engineer/Architect will furnish to the Contractor, free of charge, all copies of Drawings and Specifications reasonably necessary for the execution of the work.

SECTION 3. ORDER OF COMPLETION

On the first day of every month in which any portion of the work is to be completed, and at such times thereafter as may be reasonably requested by the Owner's Representative, the Contractor shall submit schedules that show the order in which the Contractor proposes to carry out the work for the duration of the project and, in particular, for the current month, with dates at which the Contractor will start each portion or part of the work, specific estimated dates of completion of each portion or part of the work, and a detailed description of the specific portion or part of the work to be completed by the end of the current month.

GENERAL CONDITIONS OF CONTRACT continued:

SECTION 4. OWNER OF DRAWINGS

The City of McAllen shall be the owner of all drawings, specifications, and copies thereof furnished by the Engineer/Architect. Contractor shall not reuse the same on other work and sets are to be returned to Engineer/Architect at the completion of the work on request.

SECTION 5. FAMILIARITY WITH WORK

The Owner shall make known to all prospective bidders, prior to the receipt of bids, all information that Owner may have as to subsurface conditions in the vicinity of the work, topographical maps, or other information that might assist the bidder in properly evaluating the amount and character of the work that might be required. Such information is given, however, as being the best factual information available to the Owner. The Contractor shall carefully examine the nature and location of the work, the character of equipment and facilities needed preliminary to and during the prosecution of the work, general and local conditions, and all other matters which can in any way affect the work under the Contract.

SECTION 6. CHANGED CONDITIONS

Before project conditions are disturbed, the Contractor shall notify the Owner in writing of: (1) subsurface or latent physical conditions at the site differing materially from those indicated in this Contract; or (2) previously unknown physical or other conditions at the site of an unusual nature differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this Contract. The Owner's Representative shall promptly investigate the conditions, and if it is found that such conditions do so materially differ and cause an increase or decrease in the cost of, or the time required for, performance of this Contract, the Contractor shall submit a claim for an adjustment in compensation and/or time. Contractor must provide written notice to the Owner within seven (7) days after the Contractor knew, or reasonably should have known, of such changed condition(s). Any claim of the Contractor for an adjustment of compensation and/or time hereunder after the required notice period shall not be allowed or approved, and the Contractor waives all right to additional compensation or time. If the Contractor timely provides written notice in accordance with this Section 6 and the parties fail to agree upon the adjustment to be made, the dispute shall be determined as provided in Section 36 hereinafter.

SECTION 7. MATERIALS AND APPLIANCES

Unless otherwise stipulated, the Contractor shall provide and pay for all materials, labor, water, tools, equipment, light, power, transportation and other facilities necessary for the execution and completion of the work. Unless otherwise specified, all materials incorporated in the permanent work shall be new and both workmanship and materials shall be of good quality. The Contractor shall, if required, furnish satisfactory evidence as to the kind and quality of materials. Unless otherwise stipulated, the Owner will not pay for materials stored on hand.

SECTION 8. EMPLOYEES

8.1 Neither the Contractor nor his/her employees engaged in fulfilling the terms and conditions of the awarded Construction Contract shall be considered employees of the Owner.

8.2 The Contractor shall at all times enforce strict discipline and good order among his employees, and shall seek to avoid employing on the work any unfit person or anyone not skilled in the work assigned to him. The Owner shall have the authority to request that Contractor remove any objectionable employee from project site.

8.3 Adequate sanitary facilities shall be provided by the Contractor.

GENERAL CONDITIONS OF CONTRACT continued:

SECTION 9. ROYALTIES AND PATENTS

9.1 The Contractor shall hold and save the owner and its officers, agents, servants and employees, harmless from liability of any nature or kind, including cost and expenses for, or on account of, any patented or unpatented invention, process, article or appliance manufactured or used in the performance of the contract, including its use by the Owner.

9.2 *License or Royalty Fee:* License and/or royalty fees for the use of a process which is authorized by the Owner of the project must be reasonable, and paid to the holder of the patent, or his/her authorized licensee, directly by the Contractor. If the Contractor uses any design, device or materials covered by letters, patent or copyright, he/she shall provide for such use by suitable agreement with the Owner of such patented or copyrighted design, device or material. It is mutually agreed and understood that, without exception, the contract prices shall include all royalties or costs arising from the use of such design, device or materials, in any way involved in the work. The Contractor and/or his/her Sureties shall indemnify and hold harmless the Owner of the project from any and all claims for infringement by reason of the use of such patented or copyrighted design, device or materials or any trademark or copyright in connection with work agreed to be performed under this contract, and shall indemnify the Owner for any cost, expense or damage which it may be obliged to pay by reason of such infringement at any time during the prosecution of the work or after completion of the work.

SECTION 10. SURVEYS

10.1 Unless otherwise specified, the Owner shall furnish all land surveys and establish all base lines for locating the principal component parts of the work together with a suitable number of bench marks adjacent to the work. From the information provided by the Owner, the Contractor shall develop and make all detail surveys needed for construction such as slope stakes, batter boards, stakes for pile locations, and other working points, lines and elevations.

10.2 The contractor shall carefully preserve bench marks, reference points and stakes and, in case of willful or careless destruction, he shall be charged with the resulting expense and shall be responsible for any mistakes that may be caused by their unnecessary loss or disturbance.

SECTION 11. PERMITS, LICENSES AND REGULATIONS

Permits and licenses of a temporary nature necessary for the prosecution and completion of the work shall be secured and paid for by the Contractor. Permits, licenses, and easements of a permanent nature that will be required after the completion of the project will be secured and paid for by the Owner, unless otherwise specified. The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the work as drawn and specified. If the Contractor observes that the Drawings and Specifications are at variance therewith, Contractor shall promptly notify the Engineer/Architect in writing, and any necessary changes shall be adjusted as provided in the Contract for changes in the work.

SECTION 12. PROTECTION OF THE PUBLIC AND OF WORK AND PROPERTY

12.1 The Contractor shall provide and maintain all necessary watchmen, barricades, warning lights and signs and take all necessary precautions for the protection, and safety of the public. Contractor shall take all reasonable precautions to protect the Owner's property from injury or loss arising in connection with this contract. Contractor shall make good any damage, injury or loss to his work and to the property of the Owner resulting from lack of reasonable protective precautions, except such as resulting from lack of reasonable protective precautions, except such as may be due to errors in the Contract Documents, or caused by agents or employees of the Owner. Contractor shall adequately protect adjacent private and public property, as provided by law and the Contract Documents.

GENERAL CONDITIONS OF CONTRACT continued:

SECTION 12. PROTECTION OF THE PUBLIC AND OF WORK AND PROPERTY continued:

12.2 In an emergency affecting the safety of life, work, or of adjoining property, the Contractor is hereby permitted to act at Contractor's discretion to prevent such threatened loss or injury. Contractor shall act without special instructions or authorization from the Engineer/Architect and without appeal, if so authorized or instructed by the Engineer/Architect.

12.3 Any compensation claimed by the Contractor on account of emergency work, shall be determined by agreement, litigation or arbitration.

SECTION 13. INSPECTION OF WORK

13.1 The Owner shall provide sufficient competent personnel, under the supervision of a qualified Engineer/Architect, for the inspection of the work while such work is in progress to ascertain that the completed work will comply in all respects with the standards and requirements set forth in the Specifications. Notwithstanding such inspection, the Contractor will be held responsible for the acceptability of the finished work.

13.2 The Engineer/Architect and his representatives shall at all times have access to the work whenever it is in preparation and/or progress, and the Contractor shall provide proper facilities for such access and inspection.

13.3 If the Specifications, the Engineer's/Architect's instructions, laws, ordinances, or any public authority require any work to be specially tested or approved, the Contractor shall give the Engineer/Architect timely notice of its readiness for inspection, and scheduled date of such inspection if the inspection is by an authority other than the Engineer/Architect. Inspections by the Engineer/Architect shall be made promptly and at the source of supply, where practicable. If any work should be covered up without approval or consent of the Engineer/Architect, it must be uncovered if required by the Engineer/Architect at the Contractor's expense, unless the Engineer/Architect has unreasonably delayed inspection.

13.4 Re-examination of the work may be ordered by the Engineer/Architect and if so ordered, the work must be uncovered by the Contractor. If such work is found to be in accordance with the Contract Documents, the Owner shall pay the cost of re-examination and replacement. If such work is not in accordance with the Contract Documents, the Contractor shall pay such cost.

SECTION 14. SUPERINTENDENCE

The Contractor shall keep a competent superintendent and any necessary assistants on the project site throughout the duration of the work. The superintendent shall represent the Contractor and all directives given to superintendent shall be binding as if given to the Contractor. Directives shall immediately be confirmed in writing to the Contractor. The Contractor shall give efficient superintendence to the work using best skill and attention.

SECTION 15. DISCREPANCIES

If in the course of the work, the Contractor finds any discrepancy between the Drawings and the physical conditions of the locality, or any errors or omissions in Drawings or in the layout as given by survey points and instructions, Contractor shall immediately inform the Engineer/Architect in writing, and the Engineer/Architect shall promptly verify the same. Any work done by Contractor after such discovery without prior authorization will be done at the Contractor's risk.

GENERAL CONDITIONS OF CONTRACT continued:

SECTION 16. CHANGES IN THE WORK

16.1 The Owner may make changes to the contract drawings and specifications at any time by a written order. Changes shall be within the general scope of work and reasonable for the completion of the project scope. If such changes add to or deduct from the contractor's cost of the work, the Contract Sum shall be adjusted accordingly. All such changes in the work shall be executed under the conditions of the original Contract in at mutually agreed-upon unit price and through approved Change Orders, except that any claim for extension of time or additional compensation caused thereby shall be adjusted only at the time of ordering such change. Changes to work shall be in accordance to Texas Local Government Code Chapter 252.

16.2 The Engineer/Architect shall have authority to give directives and make minor changes in the work only to the extent that the work does not involve additional cost and changes are consistent with the purposes of the work.

16.3 Except as provided for in Section 12, no extra work or change shall be made unless in pursuance of a written order by the Engineer/Architect, and no claim for additional compensation to the Contract Sum shall be valid unless the additional work was so ordered.

16.3 The Contractor shall proceed with the work as changed and the value of any changes in work or change shall be determined as provided in the Agreement. The Contractor's acceptance of any written order(s) for changes in the work constitutes the Contractor's acknowledgement that all extensions, increases or deductions of time and/or compensation, and claims and disputes related to the subject of the written order(s) have been or were resolved by the written order(s). By accepting the written order(s) for changes in the work, the Contractor waives and releases any and all claims and causes of action, including, but not limited to, claims for additional compensation or extensions of time, related to or arising from any work added to, deducted from, or affected by the written order(s).

SECTION 17. EXTENSION OF TIME

17.1 Extension of time for completion of the Work may be granted by the Owner by means of a change order and shall apply in the following instances:

- a. changes in the work, as provided in Section 16;
- b. when work is suspended as provided in Section 21;
- c. when Contractor's performance of the work is delayed on account of conditions which could not have been foreseen, or which were beyond the control of the Contractor, his Subcontractors or suppliers, and which were not the result of their fault or negligence.
- d. neglect of the Owner or of his employees or by other contractors employed by the Owner, or by any delay in the furnishing of Drawings and necessary information by the Engineer/Architect;
- e. or by any other cause which in the opinion of the Engineer/Architect entitled the Contractor to an extension of time, including but not restricted to, acts of the public enemy, acts of any government in either its sovereign or any applicable contractual capacity, acts of another contractor in the performance of a contract with the Owner, fires, floods, epidemics, quarantine restrictions, freight embargoes, usually severe weather, or labor disputes.

GENERAL CONDITIONS OF CONTRACT continued:

SECTION 17. EXTENSION OF TIME continued:

17.2 The Contractor shall notify the Owner's Representative in writing within seven (7) working days of any occurrence or conditions which describes in detail the Contractor's claim to an extension of time. Such notice shall permit full investigation and evaluation of the contractor's claim. The Engineer/Architect shall acknowledge receipt of the Contractor's notice within five (5) working days of its receipt. Contractor's failure to provide such notice shall constitute a waiver by the Contractor of any claim.

SECTION 18. CLAIMS

If the Contractor claims that any directives issued after the date of the Contract, either by Drawings or other means, involve additional cost under the Contract, Contractor shall give the Engineer/Architect written notice thereof within seven (7) working days after the receipt of such instructions, and in any event before proceeding to execute the work, except as provided for in Section 12. No such claim shall be valid unless so made.

SECTION 19. DEDUCTIONS FOR UNCORRECTED WORK

If the Engineer/Architect deems it inexpedient to correct work that has been damaged or that was not done in accordance with the Contract, an equitable deduction from the Contract price shall be made thereof, unless the Contractor elects to correct to work.

SECTION 20. CORRECTION OF WORK BEFORE FINAL PAYMENT

20.1 The Contractor shall promptly remove from the premises all materials and work rejected by the Engineer/Architect due to failing to meet Contract requirements, whether incorporated in the work or not. The Contractor shall promptly replace and re-execute the work in accordance with the Contract and without expense to the Owner and shall bear the expense of making good all work of other contractors destroyed or damaged by such removal or replacement.

20.2 If the Contractor does not take action to remove such rejected materials and work within ten (10) working days after written notice, the Owner may remove such rejected materials and may store the material at the expense of the Contractor. If the Contractor does not pay the expense of such removal and storage within ten (10) working days' time thereafter, the Owner may, upon ten (10) working days' written notice, sell such materials at auction or private sale and shall pay to the Contractor any net proceeds thereof after deducting all the costs and expenses that should have been borne by the Contractor.

SECTION 21. SUSPENSION OF WORK

21.1 The Owner may at any time suspend the work, or any part thereof by giving one (1) day written notice to the Contractor. The work shall be resumed by the Contractor within ten (10) working days after the date of the written notice from the Owner to the Contractor so to do. The Owner may reimburse the Contractor for expense incurred by the Contractor in connection with the work under this Contract as a result of such suspension; eligibility and amount of disbursement shall be determined by the Engineer/Architect.

21.2 If the work, or any part thereof, shall be suspended by written notice by Owner and if the Owner does not give written notice to the Contractor to resume work within fifteen (15) working days of the notice to suspend, then the Contractor may abandon that portion of the work and Contractor shall be entitled to the estimates and payments for all work done on the portions so abandoned, if any; Contractor is not entitled to any compensation for loss of overhead, plant expense, and anticipated profit.

GENERAL CONDITIONS OF CONTRACT continued:

SECTION 22. CONTRACTOR'S RIGHT TO STOP WORK OR TERMINATE CONTRACT

If the work should be stopped under an order of any court, or other public authority, for a period of more than three (3) months, through no act or fault of the Contractor or of anyone employed by Contractor, or if the Engineer/Architect should fail to issue any estimate for payment within seven (7) working days after it is due, then the Contractor, may, upon seven (7) working days' written notice to the Owner's Representative, stop work or terminate this Contract and recover from the Owner payment for all work executed.

SECTION 23. THE OWNER'S RIGHT TO TERMINATE CONTRACT

If the Contractor is adjudged as bankrupt, or if Contractor makes a general assignment for the benefit of its creditors, or if a receiver is appointed as a result of Contractor's insolvency, or if Contractor is guilty of a substantial violation of the Contract, then the Owner, upon the certificate of the Engineer/Architect that sufficient cause exists to justify such action, may, without prejudice to any other right or remedy terminate the Contract with the Contractor, after giving the Contractor and his Surety seven (7) working days' written notice, and take possession of the premises and of all materials, tools, equipment and other facilities installed on the work and paid for by the Owner, and finish the work by whatever method Owner may deem expedient. In such case the Contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the Contract price shall exceed the expense of finishing the work, including compensation for additional managerial and administrative services, such excess shall be paid to the Contractor. If the expense of finishing the work shall exceed such unpaid balance to the Contractor, the Contractor shall pay the difference to the Owner. The expense incurred by the Owner as herein provided and the damage incurred through the Contractor's default, shall be certified by the Engineer/Architect.

SECTION 24. REMOVAL OF EQUIPMENT

In the case of termination of the Contract for any cause before the completion of the work, the Contractor, if notified to do so by the Owner, shall promptly remove any part or all of his equipment and supplies from the Owner's property. If Contractor fails to do so, the Owner shall have the right to remove such equipment and supplies at the expense of the Contractor.

SECTION 25. RESPONSIBILITY FOR WORK

25.1 The Contractor assumes full responsibility for the work. Until its final acceptance, the Contractor shall be responsible for damage to or destruction of the work (except for any part covered by partial acceptance as set forth in Section 26). Contractor agrees to make no claims against the Owner for damages to the work from any cause (except negligence or willful acts of the Owner), acts of an enemy, acts of war, or as provided for in Section 32.

25.2 Existing Structures: The Contractor shall, at Contractor's expense, immediately make permanent repairs and restore to original condition any and all utility lines, irrigation lines, pipe lines, pavement, or structures that are to remain in place and damaged by the Contractor's equipment or workmen during the performance of work under this contract, or damaged as a result of improperly executed work.

25.3 Traffic Areas, Driveways, Entrances: All traffic areas, driveways and entrances shall be restored to usable condition at the Contractor's expense as the work progresses. The Contractor shall make every effort to cooperate with the wishes of the individual property owners in providing access to private property along the site of the work.

GENERAL CONDITIONS OF CONTRACT continued:

SECTION 25. RESPONSIBILITY FOR WORK continued:

25.4 Detours: The Contractor shall do such work as may be necessary to provide and maintain a detour adjacent to all road structures for public travel. The Contractor shall maintain the detours in such condition that the public can travel over same in comfort and safety, and shall at his own expense perform such work as may be required to keep said detours open to the public at all times. The Contractor shall cooperate with the Engineer/Architect in the regulation of traffic and Contractor shall govern its work that when it becomes necessary to suspend construction for a considerable period of time, the roadways will be re-opened to public travel. Materials and equipment shall be stored and the work shall be so conducted as to obstruct public travel as little as possible, and in no case shall there be less than twenty (20) feet in width of unobstructed roadway for the use of traffic. Materials and equipment stored in or near the path of traffic shall be protected with applicable traffic control devices in compliance with the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

25.5 Traffic Control Devices: When any section of the contraction site is closed to traffic, the Contractor shall furnish and maintain at each end of the closed section and at all intersecting streets - roads - construction site within the section, standard barricades, adequate warning signs and directional signs. All lights shall be kept burning from sunset to sunrise. If at any time the barricades are not, in the opinion of the Engineer/Architect, sufficient to prevent traffic from entering the closed portions of the street-road-construction site, the Contractor shall provide and maintain watchmen at such points and for such periods of time as the Engineer/Architect may direct. When directed by the Engineer/Architect, the Contractor shall provide and maintain such standard barricades, signs, lights and flags within the closed portion of the street-road-construction site as may be necessary to protect the work and safeguard local traffic.

25.6 No direct compensation, except as specifically provided in these specifications, will be made to the Contractor for the work and material involved in constructing and maintaining detours and approaches; furnishing, installing and maintaining barricades, danger, warning, and necessary for the proper direction, safety, and convenience of traffic during the Contract period, as this work is to be considered subsidiary to the several items for which unit prices are requested in the bid.

SECTION 26. PARTIAL COMPLETION AND ACCEPTANCE

If at any time prior to the issuance of the final payment, referred to in Section 40 hereinafter, any portion of the permanent construction has been satisfactorily completed, and if the Engineer/Architect determines that such portion of the permanent construction is not required for the operations of the Contractor but is needed by the Owner, the Engineer/Architect shall issue to the Contractor a certificate of partial completion, and thereupon or at any time thereafter the Owner may take over and use the portion of the permanent construction described in such certificate, and exclude the Contractor therefrom. The issuance of a certificate of partial completion shall not be construed to constitute an extension of the Contractor's time to complete the portion of the permanent construction to which it relates if he has failed to complete it in accordance with the terms of this contract. The issuance of such a certificate shall not operate to release the Contractor or his sureties from any obligations under this contract or the performance bond. If any prior use increases the cost of or delays the work, the Contractor shall be entitled to extra compensation, or extension of time, or both, as the Engineer/Architect may determine, unless otherwise provided.

GENERAL CONDITIONS OF CONTRACT continued:

SECTION 27. PAYMENTS WITHHELD PRIOR TO FINAL ACCEPTANCE OF WORK

27.1 The Owner, as a result of subsequently discovered evidence, may withhold or nullify the whole or part of any payment certificate to such extent as may be necessary to protect himself from loss caused by:

- (a) Defective work not remedied.
- (b) Claims filed or reasonable evidence indicating probable filing of claims by other parties against the Contractor.
- (c) Failure of the Contractor to make payments properly to Subcontractors or for material or labor.
- (d) Damage to another contractor.
- (e) Claims filed or reasonable evidence indicating probable filing of claims by Contractor against Owner.

27.2 No money may be withheld under (b) and (c) above if a payment bond is included in the Contract.

SECTION 28. CONTRACTOR'S INSURANCE REQUIREMENTS

During execution of Contracts, the successful Contractor shall provide a Certificate of Insurance made to the City of McAllen, P.O. Box 220, McAllen, TX 78505-0220, (1300 Houston, McAllen, Texas 78501) and should reference the project number and project Name. The prime contractor shall ensure that any and all subcontractors and/or lower-tier subcontractors comply with the insurance requirements as depicted herein. Such coverage(s) shall be acquired and maintained for the duration of the contract period.

All certificates must be received prior to commencement of service/work. All Certificates of insurance shall be approved by the Risk Manager and/or his/her designated representative **prior** to the commencement of any work.

In the event the insurance coverage expires prior to the completion of the executed contract, a renewal certificate shall be issued thirty (30) days prior to said expiration date. The City must be notified at least thirty (30) days prior to any material change in and/or cancellation and/or non-renewals of such policies.

The term "City" shall include The City of McAllen and/or McAllen Public Utilities (MPU) and their employees, officers, officials, agent, and volunteers in respect to the contracted services. Any failure on the part of the City to request required insurance documentation shall not constitute a waiver of the insurance requirement.

The City reserves the right to make reasonable requests or revisions pertaining to the types and limits of that coverage.

During the term of the Contract, the successful contractor/respondent/selected firm shall acquire and maintain, for the duration of the contract period the following insurances:

A. **Comprehensive Commercial General Liability:** The Contractor/Respondent/Selected Firm shall provide minimum limits of \$250,000 each occurrence, \$500,000 annual aggregate combined single limit for bodily injury and property damage liability. This shall include premises/operations, independent contractors, products, completed operations, personal and advertising injury, and contractual liability. This insurance shall apply as primary insurance with respect to any other insurance or self-insurance programs maintained by the City and shall name the "City of McAllen" as an additional insured with a waiver of subrogation. The policy of insurance shall be written on an "occurrence" form.

GENERAL CONDITIONS OF CONTRACT continued:

SECTION 28. CONTRACTOR'S INSURANCE REQUIREMENTS continued:

A. Comprehensive Commercial General Liability continued:

Blanket "XCU" – Explosion, Collapse & Underground
Independent Contractors
Care, Custody and Control
Contractual Liability

No endorsements excluding these coverages are allowed.

Additional Insured Requirement:

To the fullest extent of coverage allowed under Chapter 151 of the Texas Insurance Code, the City of McAllen and/or McAllen Public Utilities (MPU) shall be included as additional insured under the CGL policy, using ISO Additional Insured Endorsements CG20101001 and CG20371001, or endorsements providing equivalent coverage, including products completed operations

B. Business Automobile Liability: The Contractor/Respondent/Selected Firm shall maintain limits of no less than \$250,000 combined single limit per occurrence for bodily injury and property damage, and \$500,000 annual aggregate. This insurance shall apply as primary insurance with respect to any other insurance or self-insurance programs maintained by the City and shall name the "City of McAllen" as an additional insured with a waiver of subrogation. The policy of insurance shall be written on an "occurrence" form.

Applicable as long as no fragile or perishable products are transported; otherwise, Cargo Insurance is required.

Additional Insured Requirement:

To the fullest extent of coverage allowed under Chapter 151 of the Texas Insurance Code, the City of McAllen and/or McAllen Public Utilities (MPU) shall be included as additional insured under the CGL policy, using ISO Additional Insured Endorsements CG20101001 and CG20371001, or endorsements providing equivalent coverage, including products completed operations

C. Builder's Risk/Fire & Extended Coverage

The Contractor shall insure the building or other work included in this contract on an all-risk (special causes of loss) policy, with an insurance company or companies acceptable to the Owner. The amount of the insurance at all times to be at least equal to the amount paid on account of work and material and plus the value of the work or materials furnished or delivered but not yet paid for by the Owner. Builder's Risk Policies shall cover loss of materials by theft, vandalism, malicious mischief or other loss whether materials are incorporated in the work or not.

The policies shall be in the names of the City and the Contractor, as their interests may appear, and certificates of insurance shall be delivered to the Owner before monthly partial payments are made. The policy shall provide for the inclusion of names of all other contractors, subcontractors and other employed on the premises as ensured and shall stipulate that the insurance companies shall have no right to subrogation against any contractors, subcontractors or other parties employed on the premises for any work building alterations, construction or erection to the described property.

GENERAL CONDITIONS OF CONTRACT continued:

SECTION 28. CONTRACTOR'S INSURANCE REQUIREMENTS continued:

- D. **Workers' Compensation:** The contractor/respondent/selected firm shall provide and maintain workers' compensation insurance for all employees in the full amount required by statute and full compliance with the applicable laws of the State of Texas. Employer's Liability insurance shall be provided in amounts not less than \$500,000 per accident for bodily injury by accident; \$500,000 policy limit by disease; and \$500,000 per employee for bodily injury by disease."

In addition, a Waiver of Subrogation Endorsement shall be provided by the contractor naming the City of McAllen in said policy for Worker's Compensation Insurance. Contractor/Respondent/Selected Firm shall further ensure that all of its sub-contractors maintain appropriate levels of workers' compensation insurance.

- E. **Professional Services - Insurance Provisions:** Errors & Omissions (Professional Liability): \$1,000,000 Each Claim Limit \$1,000,000 Aggregate Limit. If coverage is written on a claims-made basis, the retroactive date shall be on or prior to the date of the contractual Agreement. The certificate of insurance shall state that the coverage is claims-made and include the retroactive date. The insurance shall be maintained for the duration of the contractual Agreement and for four (4) years following completion of the services provides under the contractual Agreement or for the warranty period, whichever is longer. An annual certificate of insurance submitted to the City shall evidence coverage-
- F. **Deductible Clause:** Contractor/Respondent/Selected Firm to declare self-insured retention or deductible amounts in excess of \$25,000.
- G. **Other Provisions:** All insurance carriers shall be rated A6 or better and be published on a current A.M. Best Rating Guide, or some other recognized equivalent rating service (e.g., Moody's, Standard & Poor's). The City may request a copy of the insurance policy according to the nature of the project. City reserves the right to accept or reject the insurance carrier. All Certificates of Insurance shall be provided on the Acord Form 25. All insurance requirements are imposed and must be complied with by any and all sub-contractors, and/or lower-tier sub-contractors. A copy of endorsements providing Additional Insured, Primary Insurance and Waiver of Subrogation wording shall be attached to the certificates of insurance.

SECTION 29. PAYMENT AND PERFORMANCE BONDS

The Owner shall have the right, prior to the signing of the Contract, to require the Contractor to furnish bonds covering the faithful performance of the Contract and the payment of all obligations arising thereunder, in such form as the Owner may prescribe in the bidding documents and executed by one or more financially responsible sureties. If such bonds are required, the premium shall be paid by the Contractor. The Owner may require additional bond if the contract is increased appreciably.

SECTION 30. ASSIGNMENT

Neither party to the Contract shall assign the Contract or sublet it as a whole without the written consent of the other, nor shall the Contractor assign any moneys due to Contractor or to become due to Contractor hereunder, except to bank or financial institution acceptable to the Owner.

GENERAL CONDITIONS OF CONTRACT continued:

SECTION 31. RIGHTS OF VARIOUS INTERESTS

If work by the Owner's or Contractor's forces is contiguous to work covered by this Contract, the respective rights of the various interests involved shall be established by the Engineer/Architect to secure the completion of the various portions of the work in general harmony.

SECTION 32. SEPARATE CONTRACTS

32.1 The Owner reserves the right to permit other contracts in connection with the project. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work, and shall properly connect and coordinate Contractor's work with other contracted parties. The parties agree that the Owner shall not be responsible or liable for any delays in Contractor's progress or completion of the work that are caused, in whole or in part, by the acts or omissions of other contractors, subcontractors, or third parties.

32.2 If the proper execution or results of any part of the Contractor's work depends upon the work of any other contract, the Contractor shall inspect and promptly report to the Engineer/Architect any defects in such work that render it unsuitable for such proper execution and results.

SECTION 33. SUBCONTRACTS

33.1 The Contractor shall, as soon as practical after signing of the Contract, notify the Engineer/Architect in writing of the names of Subcontractors proposed for the work.

33.2 The Contractor shall be fully responsible to the Owner for the acts and omissions of its Subcontractors and of persons either directly or indirectly employed by them.

33.3 Nothing contained in the Contract Documents shall create any contractual relationship between any Subcontractor and the Owner.

SECTION 34. ENGINEER'S/ARCHITECT'S STATUS

The Engineer/Architect shall perform technical observation of the work. Engineer/Architect has authority to stop and suspend the work as may be necessary to insure the proper execution of the contract. Engineer/Architect shall also have authority to reject all work and materials which do not conform to the Contract and to decide questions which arise in the execution of the work.

SECTION 35. ENGINEER'S/ARCHITECT'S DECISION

The Engineer/Architect shall, within a reasonable time after having received proper notification, make decisions in writing on all claims of the Owner or the Contractor and on all other matters relating to the execution and progress of the work or the interpretation of the Contract Documents.

SECTION 36. JURISDICTION AND VENUE; MEDIATION, LITIGATION AND ARBITRATION

36.1 As a condition precedent to any suit or arbitration being filed or initiated, any controversy or claim arising out of or relating to this contract, or the breach thereof, is subject to mandatory mediation to take place in Hidalgo County, Texas at a time agreed upon by the parties. Such mediation must be held within thirty (30) days after the date either party requests mediation, unless otherwise agreed.

GENERAL CONDITIONS OF CONTRACT continued:

SECTION 36. JURISDICTION AND VENUE; MEDIATION, LITIGATION AND ARBITRATION continued:

36.2 The Parties agree that any dispute arising out of or related to this Contract would likely involve an inquiry and interpretation of a substantial federal issue. Accordingly, the parties further agree that, if such mediation is unsuccessful, the proper and exclusive forum and venue in all legal actions brought to enforce or construe any of the provisions of this Contract shall be in the United States District Court for the Southern District of Texas, McAllen Division. The Owner and Contractor agree and stipulate that the United States District Court for the Southern District of Texas, McAllen Division, has personal jurisdiction over the parties. However, if federal subject matter jurisdiction is found to be lacking in any legal action, or if a federal court otherwise refuses or fails to exercise jurisdiction over the parties or the dispute, the Parties agree to submit any dispute arising out of or related to this Contract to binding arbitration pursuant to the Texas General Arbitration Act, Chapter 171 of the Texas Civil Practice and Remedies Code ("TAA") and the terms of this Section 36. To the extent that TAA and this Section 36 conflict, the provisions of this Section 36 will apply.

36.3 The parties will select a single arbitrator in accordance with the rules of the American Arbitration Association. The parties further agree that all depositions in any arbitration shall be limited to a total of 24 hours for each party. The parties further agree that the parties shall not serve interrogatories or requests for admission on the other party. The parties further agree that the parties will instruct the Arbitrator, and the Arbitrator is required, to follow the substantive law of the State of Texas and to issue a reasoned award with findings of fact and conclusions of law. **The Arbitrator does not have authority to render a decision which contains a reversible error of state or federal law; the Arbitrator exceeds the Arbitrator's powers if the Arbitrator renders a decision which contains a reversible error of state or federal law.** The parties further agree that a court reporter shall be present and keep a record of all hearings, which shall be conducted in Hidalgo County, Texas, and the cost of which will be divided equally among the parties notwithstanding any final award entered by the Arbitrator.

36.4 The parties further agree that the award of the Arbitrator may be reviewed based on the record by a state district court having jurisdiction over the parties and the subject matter and that, notwithstanding the applicability of the TAA, such district court shall conduct a *de novo* review of the award of the Arbitrator and consider any improper application of the law, and/or abuse of discretion by the Arbitrator, in considering the award of the Arbitrator and determining whether to confirm, vacate or modify the award of the Arbitrator. The parties further agree that any judgment or final order entered by the district court is subject to further appellate review consistent with applicable rules of appellate procedure that otherwise would be followed upon a judgment or final order being issued by such District Court.

SECTION 37. COORDINATION WITH OTHER PARTIES

The Contractor shall coordinate the Contractor's schedule with the schedule, work, labor, materials and/or equipment provided by all other contractors, subcontractors, manufacturers and suppliers to ensure timely completion of the project. The Contractor shall be responsible for reducing, mitigating, eliminating or limiting any delays or damages caused, in whole or in part, by all other contractors, subcontractors, manufacturers, suppliers and any other third parties, including, but not limited to, delays or damages caused by a lack of access to the lands upon which the work under the Contract is to be done. The parties agree that the Owner is not liable for any delays or damages caused, in whole or in part, by any other contractors, subcontractors, manufacturers, suppliers and/or any other third parties. The Contractor shall provide at his own expense and without liability to the Owner any land and access thereto that may be required for temporary construction facilities, or for storage of material.

GENERAL CONDITIONS OF CONTRACT continued:

SECTION 38. LAND FOR WORK

38.1 The Owner shall provide as indicated on Drawings, and not later than the date when needed by the Contractor, the lands upon which the work under this Contract is to be done, right-of-ways for access to same, and such other lands which are designated on the Drawings for the use of the Contractor. Such lands and right-of-ways shall be adequate for the performance of the Contract. Any delay in the furnishing of these lands by the Owner shall be deemed proper cause for an equitable adjustment in both Contract price and time of completion.

38.2 The Contractor shall provide at his own expense and without liability to the Owner any additional land and access thereto that may be required for temporary construction facilities, or for storage of material.

SECTION 39. CLEANING UP

The Contractor shall remove from the Owner's property and from all public and private property all temporary structures, rubbish and waste materials resulting from Contractor's operations, at Contractor's expense. This requirement shall not apply to property used for permanent disposal of rubbish or waste, and materials in accordance with permission granted of such disposal to the Contractor by the Owner thereof.

SECTION 40. ACCEPTANCE AND FINAL PAYMENT

40.1 Upon receipt of written notice that the work is substantially completed or ready for final inspection and acceptance, the Engineer/Architect will promptly make such inspection, if Engineer/Architect finds the work acceptable under the Contract, and Contract fully performed, or substantially completed, Engineer/Architect shall promptly issue a signed certificate stating that the work required by this Contract has been completed or substantially completed and is accepted by Engineer/Architect under the terms and conditions thereof. The certificate shall contain the entire balance found to be due and payable to the Contractor, including the retained percentage, less a retention based on the Engineer's/Architect's estimate of the fair value of the claims against the Contractor and the cost of completing the incomplete or unsatisfactory items of work with specified amounts for each incomplete or defective item of work. The date of substantial completion of a project or specified area of a project is the date when the construction is sufficiently completed in accordance with the Contract Documents as modified by any change orders agreed to by the parties so that the Owner can occupy the project for the use for which it was intended.

40.2 Before issuance of final payment, the Contractor, if required in the Special Conditions, shall certify in writing to the Engineer/Architect that all payrolls, material bills, and other indebtedness or liens, with the work have been paid, or otherwise satisfied, except that in case of disputed indebtedness or liens, if the Contract does not include a payment of all such disputed amounts, including all related costs and interest in connection with said disputed indebtedness or lien which the Owner may be compelled to pay upon adjudication.

40.3 The making and acceptance of the final payment shall constitute a waiver of all claims by the Owner, other than those arising from unsettled liens, from faulty work appearing within a one year guarantee period from date of acceptance, from the requirements of the Drawings and Specifications, or from the manufacturer's guarantees. It shall also constitute a waiver of all claims by the Contractor, except those previously made and still unsettled.

GENERAL CONDITIONS OF CONTRACT continued:

SECTION 40. ACCEPTANCE AND FINAL PAYMENT continued:

40.4 In the event that the Contractor has previously made a claim that is still unsettled, the Owner shall be entitled to withhold from the final payment, as an offset, any amounts that the Owner, in its sole discretion, believes that the Contractor may owe to the Owner for liquidated damages or for the Contractor's failure to timely complete the project. Notwithstanding anything to the contrary herein, the Owner shall not be liable, in any event, for any interest that accrues on any amount(s) withheld from the final payment, as an offset, that the Owner, in its sole discretion, believes that the Contractor may owe to the Owner for liquidated damages or for the Contractor's failure to timely complete the project.

40.5 If after the work has been substantially completed, full completion thereof is materially delayed through no fault of the Contractor's and the Engineer/Architect so certified, the Owner shall, upon certificate of the Engineer/Architect, and without terminating the contract, make payment of the balance due for that portion of the work fully completed and accepted. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

40.6 Payments shall be in accordance with Texas Government Code § 2251. The Owner shall not be responsible for paying any interest on any amounts withheld from any progress payments or from final payment that the Owner, in its sole discretion, believes that the Contractor may owe to the Owner for liquidated damages or for the Contractor's failure to timely complete the project.

40.7 Contractor is advised that it shall be a requirement of this contract to submit the following forms, properly executed, along with their final Request for Payment: "AFFIDAVIT AND WAIVER OF LIEN-PRIME CONTRACTOR", "RELEASE AND WAIVER OF CLAIMS BY SUBCONTRACTORS AND PRODUCT VENDORS", "CONTRACTOR'S AFFIDAVIT AS TO STATUS OF LIENS". **Failure to submit these forms as required will cause a delay in payment to the contractor.**

SECTION 41. GENERAL GUARANTY

41.1 Neither the final certificate of payment nor any provision in the Contract Documents nor partial or entire occupancy of the premises by the Owner shall constitute an acceptance of work not done in accordance with the Contract Documents or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship. The Contractor shall guarantee all materials and equipment furnished and Work performed for a period of one (1) year from the date of Substantial Completion. The Contractor warrants and guarantees for a period of one (1) year from the date of Final Acceptance of the system that the completed system is free from all defects due to faulty materials or workmanship and the Contractor shall promptly make such corrections as may be necessary by reason of such defects including the repairs of any damage to other parts of the system or other work resulting from such defects.

41.2 The Owner will give notice of observed defects with reasonable promptness. In the event that the Contractor should fail to make such repairs, adjustments, or other work that may be made necessary by such defects, the Owner may do so and charge the Contractor the cost thereby incurred. The Performance Bond shall remain in full force and effect through the guarantee period.

GENERAL CONDITIONS OF CONTRACT continued:

SECTION 42. SHOP DRAWINGS

The approval of shop drawings by the Engineer/Architect shall not be construed as a complete check, but will indicate only that the general method of construction and detailing is satisfactory. Approval of such drawings will not relieve the Contractor of the responsibility for any error which may exist as the Contractor shall be responsible for the dimensions and design of adequate connections, details and satisfactory construction of all work.

SECTION 43. TESTING

All testing authorized by the Engineer/Architect that meets specification requirements will be paid for by the Owner. Tests on materials that fail will be billed to and paid for by the Contractor.

SECTION 44. PAYMENTS

44.1 Payments shall be in accordance with Texas Government Code § 2251.

44.2 Contractor shall submit to the Owner a Certificate for Payment on or before the 1st of the month.

44.3 The Owner shall pay to the Contractor for the performance of the work the amounts determined for the total number of each of the units of work completed at the unit price stated thereafter. The total number of units contained in the schedule is approximate only, and the final payment shall be made for the actual number of units that are incorporated in or made necessary by the work covered by the contract.

SECTION 45. PROGRESS PAYMENTS

The owner shall make payments on account of the Contract as follows:

45.1 On not later than the first day of every month the Contractor shall present to the Engineer/Architect a Certificate for Payment covering the total quantities under each item of work that has been completed from the start of the job to and including the last day of the preceding month, and the value of the work so completed determined in accordance with the schedule of unit prices for such items together with such supporting evidence as may be required by the Engineer/Architect.

45.2 Measurements of units for payment shall be made in accordance with the Special Conditions of the contract.

45.3 Owner's duty to pay shall be after receipt of complete certificate for payment certified by Engineer/Architect. Owner shall pay by mail to the Contractor (90%) of the amount of the invoice--less previous payments made. The (10%) retained percentage may be held by the Owner until the value of the work completed at the end of any month equals 50 percent of the total amount of the Contract after which, if the Engineer/Architect finds that satisfactory progress is being made, recommendation shall be that all of the remaining monthly payments be paid at a percentage of retainage less than stated above. Payments for work under subcontracts of the Contractor, shall be subject to the above conditions applying to the Contract after the work under a Subcontract has been 50 percent completed.

45.4 For purposes of Tex. Gov't Code § 2251.021(a)(2), the date the performance of service is complete is the date when the Owner's Designated Representative (ODR) approves the Application for Payment.

GENERAL CONDITIONS OF CONTRACT continued:

SECTION 46. RETAINAGE

Contracts equaling a total amount of \$400,000.00 or over will bear a retainage of five percent (5%) on each partial disbursement. Contracts totaling less than \$400,000.00 will bear a retainage of ten percent (10%) on each partial disbursement.

SECTION 47. OVERTIME

Contractor shall pay its employees performing work under the contract time and one half for all hours worked in excess of forty (40) hours in one work week.

SECTION 48. RIGHT TO AUDIT

The Owner reserves the right to audit the Contractor's books and records relating to the performance of the contract. The Owner, at its own expense, shall have the right at all reasonable times during normal business hours and upon at least twenty-four (24) hours' advance notice, to audit, examine, and make copies of or extracts from the books of account and records maintained by the Contractor with respect to the Construction Contract. If such audit shall disclose overpayment by Owner to Contractor, written notice of such overpayment shall be provided to the Contractor and the amount of overpayment shall be promptly reimbursed by Contractor to the Owner. In the event any such overpayment is not paid within ten (10) business days after receipt of such notice, the unpaid amount of such overpayment shall bear interest at the rate of one percent (1%) per month from the date of such notice until paid.

SECTION 49. INDEMNITY AND HOLD HARMLESS AGREEMENT

TO THE FULLEST EXTENT PERMITTED BY LAW, THE CONTRACTOR WILL DEFEND, INDEMNIFY AND HOLD HARMLESS THE OWNER, THE OWNER'S REPRESENTATIVE, THE ENGINEER/ARCHITECT AND THEIR AGENTS AND EMPLOYEES FROM ANY AND ALL CLAIMS, DAMAGES, LOSSES AND EXPENSES, INCLUDING ATTORNEYS' FEES, ARISING OUT OF OR RESULTING FROM THE PERFORMANCE OF THE WORK, INCLUDING, BUT NOT LIMITED TO, CLAIMS, DAMAGE, LOSS OR EXPENSES ATTRIBUTABLE TO BODILY INJURY, SICKNESS, DEATH OR TO ANY INJURY TO DESTRUCTION OF TANGIBLE PROPERTY, INCLUDING THE LOSS OF USE RESULTING THEREFROM, CAUSED IN WHOLE OR IN PART BY ANY NEGLIGENT OR WILLFUL ACT OR OMISSION OF THE CONTRACTOR, SUBCONTRACTOR, ANYONE DIRECTLY OR INDIRECTLY EMPLOYED BY THEM OR ANYONE FOR WHOSE ACTS ANY OF THEM MAY BE LIABLE.

SECTION 50. LIMITATION OF LIABILITY

THE OWNER'S LIABILITY TO CONTRACTOR UNDER ANY CLAIM FOR BREACH OF CONTRACT IS LIMITED PURSUANT SECTION 271.153 OF THE TEXAS LOCAL GOVERNMENT CODE.

NOTWITHSTANDING THE FOREGOING, AND TO THE FULLEST EXTENT PERMITTED BY LAW, THE OWNER'S LIABILITY TO CONTRACTOR SHALL NOT EXCEED THE DIFFERENCE BETWEEN CONTRACTOR'S ACTUAL COSTS TO COMPLETE THE WORK, ON ONE HAND, AND THE TOTAL AMOUNT OF COMPENSATION FOR WHICH CONTRACTOR AGREED TO PERFORM ALL OF THE WORK DESCRIBED IN THE CONTRACT DOCUMENTS AS REFERENCED IN THE BID SCHEDULE AND IN ARTICLE 1 OF THE FORM OF AGREEMENT, ALLOWING FOR ADJUSTMENTS IN THE COMPENSATION OWED TO CONTRACTOR PURSUANT TO ANY CHANGE ORDERS AGREED UPON BY THE PARTIES IN WRITING, ON THE OTHER HAND.

GENERAL CONDITIONS OF CONTRACT continued:

SECTION 50. LIMITATION OF LIABILITY continued:

ADDITIONALLY, REGARDLESS OF THE NATURE OF ANY CLAIM(S) ASSERTED AGAINST THE OWNER, THE PARTIES AGREE THAT THE OWNER SHALL NOT BE LIABLE TO THE CONTRACTOR FOR ANY LABOR OVERRUN, EQUIPMENT OVERRUN, MATERIAL ESCALATION, EXTENDED FIELD COSTS, DELAYS CAUSED BY THE SUBMISSION OF INCORRECT OR INCOMPLETE SUBMITTALS, CONSEQUENTIAL DAMAGES, INDIRECT DAMAGES, INCIDENTAL DAMAGES, PUNITIVE OR EXEMPLARY DAMAGES, OR ANY OTHER NON-DIRECT DAMAGES, INCLUDING, BUT NOT LIMITED TO, LOST PROFITS, LOSS OF BONDING CAPACITY, UNABSORBED HOME OFFICE OVERHEAD, LOSS IN LABOR PRODUCTIVITY, OR ANY CONSEQUENTIAL DAMAGES THAT OTHERWISE WOULD BE ALLOWED UNDER SECTION 271.153(A)(1) OF THE TEXAS LOCAL GOVERNMENT CODE.

SECTION 51. CHAPTER 2252, TEXAS GOVERNMENT CODE

In accordance with Chapter 2252 of the Texas Government Code, the Contractor hereby certifies that (a) Contractor does not engage in business with Iran, Sudan or any foreign terrorist organization and (b) Contractor is not listed by the Texas Comptroller as a terrorist organization.

SECTION 52. CHAPTER 2270, TEXAS GOVERNMENT CODE

If Respondent is required to make a certification pursuant to Section 2270.002 of the Texas Government Code, Respondent certifies that Respondent does not boycott Israel and will not boycott Israel during the term of the contract resulting from this solicitation. If Respondent does not make that certification, Respondent must indicate that in its Response and state why the certification is not required.

END OF SECTION

SUPPLEMENTAL GENERAL CONDITIONS OF CONTRACT FOR ENGINEERING/ARCHITECTURAL CONSTRUCTION

1. TEXAS WORKERS' COMPENSATION COMMISSION RULE §110.110

The Contractor shall not commence work under this contract until he has obtained all the insurance required under this paragraph and such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence work on his subcontract until the insurance required of the subcontractor has been so obtained and approved. *For required coverages see General Conditions of Contract Section 28. Contractor's Insurance Requirements.*

Contractor shall abide by the Texas Workers' Compensation Commission rule §110.110 concerning requirements for governmental entities awarding a contract for a building or construction project, and for persons providing services on a building or construction project for a governmental entity.

Preamble to Rule 110.110 is provided as a guide to Contractor:

PREAMBLE TO RULE 110.110

The Texas Workers' Compensation Commission adopts new §110.110, concerning requirements for governmental entities awarding a contract for a building or construction project, and for persons providing services on a building or construction project for a governmental entity. The new rule is adopted with changes to the proposed text published in the April 26, 1994 issue of the Texas Register (19 TexReg 3131). Subsections (a)(7) and (c)(7) were amended by adding language to further clarify who is covered by the rule. Subsections (c)(7)(J) and (e)(3) were added to clarify that a contractor or subcontractor is representing to the governmental entity that workers' compensation coverage is provided. Subsections (d)(8)(C) were added to require specific language regarding representations of coverage to be added to contracts to provide services on the project. Subsections (c)(7)(F), and (c)(7)(I)(5), (d)(5), (d)(8)(F), (e)(6), and (e)(8)(F) were amended to reduce the retention period for contractors and other persons providing services on the project from three years to one year. Subsection (g) was changed to state that this rule applies to contract advertised for bid after September 1, 1994, rather than awarded after September 1, 1994.

The Texas Labor Code, §406.096, requires workers' compensation insurance coverage for all persons providing services on a building or construction project for a governmental entity. The commission is aware that this statutory requirement is not being met, and this rule is designed to achieve compliance and to implement a recordkeeping process which will enable oversight of compliance. The rule does this by placing requirements on the governmental entity and on contractors and other persons providing services on a project. These requirements include coverage, certificates of coverage, posted notices of coverage, and notification of changes in coverage status. The rule does not create any duty or burden on anyone which the law does not establish.

The rule defines terms which apply to governmental entity building or construction projects and sets up a clear procedure for governmental entities and contractors that bid for building and construction projects to follow in complying with the requirements of the Texas Labor Code §406.096. It also defines "persons who provide services on a project" who are subject to the statutory requirement of coverage, and sets forth their requirements to comply with the statute and the rule.

1. TEXAS WORKERS' COMPENSATION COMMISSION RULE §110.110 continued:

It specifically excludes persons such as food/beverage vendors whose deliveries and labor are not permanently incorporated into the project. The rule puts persons on notice that providing false or misleading certificates of coverage, or failing to provide or maintain required coverage, or failing to report any change that materially affects the provision of coverage may subject the contractor or other persons providing services on the project to administrative penalties, civil penalties, or other civil actions.

The rule requires a governmental entity to timely obtain certificates of coverage, retain them for the duration of the project plus three years, and provide them to the commission upon request and to others entitled to them by law. It also requires the governmental entity, as a prerequisite to awarding a contract, and as part of the contract, to require that the contractor: provide coverage and certificates of coverage for the contractor's employees; timely obtain and provide the governmental entity all required certificates of coverage for all persons providing services on the project; retain certificates of coverage on file for the duration of the project and for one year thereafter; notify the governmental entity in writing by certified mail or person 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; post notices on each project site; and contractually require persons with whom it contracts to do the same, with the certificates of coverage to be provided to the person for whom they are providing services. The rule also sets out the language to be included in bid specifications and in contracts awarded by a governmental entity and the information required to be in the posted notice to employees. It further established a method for obtaining the certificates from persons providing services on the project and providing them to the governmental entity.

It requires a contractor awarded a building or construction contract to: provide workers' compensation coverage to the contractor's employees for the duration of the project; file a certificate of coverage of the contractor's employees with the governmental entity prior to being awarded a contract; obtain and provide to the governmental entity, certificates of coverage from each other person with whom it has contracted to provide services on the project, prior to that person beginning work on the project; obtain and provide new certificates of coverage shown on the current certificate ends during the duration of the project; retain all certificates of coverage for the duration of the project and for one year thereafter; notify the governmental entity of material changes in coverage; contractually require each other person with whom it contracts to provide a certificate of coverage; and post notices on each project site.

All other persons providing services on a project have the same requirements as a contractor, with the exception of posting notices and with the exception that the certificate of coverage is given to the person for whom they contracted to provide services on the project. The rule uses the term "persons providing services on the project" in lieu of the statutory term "subcontractor" because the term "subcontractor" as used in the statute (§406.096) and in this rule is broader than standard industry usage. The use of the different terminology will prevent confusion.

The rule does not create any duty or burden on anyone which the law does not establish.

The new rule is adopted under the Texas Labor Code, §402.061, which authorizes the commission to adopt rules necessary to administer the Act, and Texas Labor Code, §406.096, which establishes requirements for governmental entities, contractors, and subcontractors ("persons providing services on the project") regarding workers' compensation coverage for workers on compensation coverage for workers on public building or construction projects.

1. TEXAS WORKERS' COMPENSATION COMMISSION RULE §110.110 continued:

Rule 110.100 Reporting Requirements for Building or Construction Projects for Governmental Entities

- (a) The following word and terms, when used in this rule, shall have the following meanings, unless the context clearly indicates otherwise. Terms not defined in this rule shall have the meaning defined in the Texas Labor Code, if so defined.
- (1) Certificate of coverage ("certificate")-A copy of a certificate of insurance, a certificate of authority to self-insure issued by the 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 (including those subject to a coverage agreement) providing services on a project, for the duration of the project.
 - (2) Building or construction - Has the meaning defined in the Texas Labor Code, (e)(1).
 - (3) Contractor - A person bidding for or awarded a building or construction project by a governmental entity.
 - (4) Coverage - Workers' compensation insurance meeting the statutory requirements of the Texas Labor Code, §401.011(44).
 - (5) Coverage agreement - A written agreement on form TWCC-81, form TWCC-82, form TWCC-83, or form TWCC-84, filed with the Texas Workers' Compensation Commission which establishes a relationship between the parties for purposes of the Workers' Compensation Act, pursuant to the Texas Labor Code, Chapter 406, Subchapters F and G as one of employer/employee and establishes who will be responsible for providing workers' compensation coverage for person providing services on the project.
 - (6) Duration of the project - Includes the time from the beginning of work on the project until the work on the project has been completed and accepted by the governmental entity.
 - (7) Persons providing services on the project ("subcontractor" in §406.096 of the Act) - 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 but is not limited to independent contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity, or employees of any entity furnishing persons to perform services on the project. "Services" includes but is not limited to providing, hauling, or delivering equipment or materials, or providing labor, transportation, or other services 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.
 - (8) Project - Includes the provision of all services related to a building or construction contract for a governmental entity.

1. TEXAS WORKERS' COMPENSATION COMMISSION RULE §110.110 continued:

- (b) Providing or causing to be provided a certificate of coverage pursuant to this rule is a representation by the insured that all employees of the insured who are providing services on the project are covered by workers' compensation coverage, that the coverage is based on proper reporting of classification codes and payroll amounts, and that all coverage agreements have been 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 certificates of coverage, or failing to provide or maintain required coverage, or failing to report any change that materially affects the provision of coverage may subject the contractor or other person providing services on the project to administrative penalties, criminal penalties, civil penalties, or other civil actions.
- (c) A governmental entity that enters into a building or construction contract on a project shall:
 - (1) include in the bid specifications, all the provisions of subsection (d) of this rule, using the language required by paragraph (7) of this subsection;
 - (2) as part of the contract, using the language required by paragraph (7) of this subsection, require the contractor to perform as required in subsection (d) of this rule;
 - (3) obtain from the contractor a certificate of coverage for each person providing services of the project, prior to that person beginning work on the project;
 - (4) obtain from the contractor a new certificate of coverage showing extension of coverage:
 - (A) before the end of the current coverage period, if the contractor's current certificate of coverage shows that the coverage period ends during the duration of the project; and
 - (B) no later than seven days after the expiration of the coverage for each other person providing services on the project whose current certificate shows that the coverage period ends during the duration of the project;
 - (5) retain certificates of coverage on file for the duration of the project and for three years thereafter;
 - (6) provide a copy of the certificates of coverage to the commission upon request and to any person entitled to them by law; and
- A
- (7) use the following language for bid specifications and contracts, without any additional words or changes, except those required to accommodate the specific document in which they are contained or to impose stricter standard of documentation in Figure 1:

1. TEXAS WORKERS' COMPENSATION COMMISSION RULE §110.110 continued:

Article __. Worker's Compensation Insurance Coverage.

A. Definitions:

Certificate of coverage ("certificate")-A copy of a certificate of insurance, a certificate of authority to self-insure issued by the 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.

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 governmental entity. Persons providing services on the project ("subcontractor" in §406.096)-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 a classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.044(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 to the governmental entity prior to being awarded the contract.
- 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 governmental entity showing that coverage has been extended.
- E. The contractor shall obtain from each person providing services on a project, and provide to the governmental entity:
 - (1) a certificate of coverage, prior to that person beginning work on the project, so the governmental entity will have on file certificate 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.

1. TEXAS WORKERS' COMPENSATION COMMISSION RULE §110.110 continued:

- G. The contractor shall notify the governmental entity 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, for 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 whom 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 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 certificates of coverage on file for the duration of the project and for one year thereafter;
 - (6) notify the governmental entity 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 persons 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.

1. TEXAS WORKERS' COMPENSATION COMMISSION RULE §110.110 continued:

J. By signing this contract or providing or causing to be provided a certificate of coverage, the contractor is representing to the governmental entity 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, 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 governmental entity to declare the contract void if the contractor does not remedy the breach within ten (10) days after receipt of notice of breach from the governmental entity.

(d) A contractor shall:

- (1) provide coverage for its employees providing services on a project, for the duration of the project based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements;
- (2) provide a certificate of coverage showing workers' compensation coverage to the governmental entity prior to beginning work on the project;
- (3) provide the governmental entity, prior to the end of the coverage period, a new certificate of coverage showing extension of coverage, if the coverage period shown on the contractor's current certificate of coverage ends during the duration of the project;
- (4) obtain from each person providing services on a project, and provide to the governmental entity:
 - (A) a certificate of coverage, prior to that person beginning work on the project, so the governmental entity will have on file certificates of coverage showing coverage for all persons providing services on the project; and
 - (B) 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;
- (5) retain all required certificates of coverage on file for the duration of the project and for one year thereafter;
- (6) notify the governmental entity 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;

1. TEXAS WORKERS' COMPENSATION COMMISSION RULE §110.110 continued:

- (7) post a notice on each project site informing all persons providing services on the project that they are required to be covered, and stating how a person may verify current coverage and report failure to provide coverage. This notice does not satisfy other posting requirements imposed by the Act or other commission rules. This notice must be printed with a title in at least 30 point bold type and text in at least 19 point normal type, and shall be in both English and Spanish and any other language common to the worker population. The text for the notices shall be the following text in Figure 2 provided by the commission on the sample notice, without any additional word or changes:

(Figure 2)

REQUIRED WORKERS' COMPENSATION COVERAGE

“The law required that each person working on this site or providing services related to this construction project must be covered by workers’ compensation insurance. This includes persons providing, hauling, or delivering equipment or materials, or providing labor or transportation or other service related to the project, regardless of the identity of their employer or status as an employee.”

“Call the Texas Workers’ Compensation Commission at 512-440-3789 to receive information on the legal requirements of coverage, to verify whether your employer has provided the required coverage or to report an employer’s failure to provide coverage.” and

- (8) contractually require each person with whom it contracts to provide services on a project, to:
- (A) provide coverage based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements for all of its employees providing services on the project, for the duration of the project;
 - (B) provide a certificate of coverage to the contractor prior to that person beginning work on the project;
 - (C) include in all contracts to provide services on the project the language in subsection (e)(3) of this rule;
 - (D) 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;
 - (E) obtain from each other person with whom it contracts and provide to the contractor:
 - (i) a certificate of coverage, prior to the other person beginning work on the project; and
 - (ii) prior to the end of the coverage period, a new certificate of coverage showing extension of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the project;

1. TEXAS WORKERS' COMPENSATION COMMISSION RULE §110.110 continued:

- (F) retain all required certificates of coverage on file for the duration of the project and for one year thereafter;
- (G) notify the governmental entity 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
- (H) contractually require each other person with whom it contracts, to perform as required by paragraphs (A) - (H), with the certificate of coverage to be provided to the person for whom they are providing services.

(e) A person providing services on a project, other than a contractor, shall:

- (1) provide coverage for its employees providing services on a project, for the duration of the project based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements;
- (2) provide a certificate of coverage as required by its contract to provide services on the project, prior to beginning work on the project;
- (3) have the following language in its contract to provide services on the project:

“By signing this contract or providing or causing to be provided a certificate of coverage, the person signing this contract is representing to the governmental entity that all employees of the person signing this contract 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.”

- (4) provide the person for whom it is providing services on the project, prior to the end of the coverage period shown on its current certificate of coverage, a new certificate showing extension of coverage, if the coverage period shown on the certificate of coverage ends during the duration of the project;
- (5) obtain from each person providing services on a project under contract to it, and provide as required by its contract:
 - (A) a certificate of coverage, prior to the other person beginning work on the project; and
 - (B) prior to the end of the coverage period, a new certificate of coverage showing extension of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the project;

1. TEXAS WORKERS' COMPENSATION COMMISSION RULE §110.110 continued:

- (6) retain all required certificates of coverage on file for the duration of the project and for one year thereafter;
- (7) notify the governmental entity in writing by certified mail or personal delivery, of any change that materially affects the provision of coverage of any person providing services on the project and send the notice within 10 days after the person knew or should have known of the change; and
- (8) contractually require each other person with whom it contracts to:
 - (A) provide coverage based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements for all of its employees providing services on the project, for the duration of the project;
 - (B) provide a certificate of coverage to it prior to that other person beginning work on the project;
 - (C) include in all contracts to provide services on the project the language in subsection (e)(3) of this rule;
 - (D) provide, prior to the end of the coverage period, a new certificate of coverage showing extension of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the project;
 - (E) obtain from each other person under contract to it to provide services on the project, and provide as required by its contract;
 - (F) retain all required certificates of coverage on file for the duration of the project and for one year thereafter;
 - (G) notify the governmental entity 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
 - (H) contractually require each person with whom it contracts, to perform as required by paragraphs (A) - (H), with the certificate of coverage to be provided to the person for whom they are providing services.
- (f) If any provision of this rule or its application to any person or circumstance is held invalid, the invalidity does not affect other provisions or applications of this rule that can be given effect without the invalid provision or applications, and to this end the provisions of this rule are declared to be severable.
- (g) This rule is applicable for building or construction contracts advertised for bid by a governmental entity on or after September 1, 1994.

2. PREVAILING WAGE LEGAL REQUIREMENTS

The Contractor's attention is called to Articles 5159A and 5160 of the Revised Civil statutes of Texas which Statutes must be complied with. These articles are as follows:

ARTICLE 5159A:

SECTION 1. Not less than the general prevailing rate of per diem wages for work of a similar character in the locality which the work is performed, and not less than the general prevailing rate of per diem wages for legal holiday and overtime work, shall be paid to all laborers, workmen and mechanics employed by or on behalf of any County, City and County, City, Town, District or other political subdivision of the State, engaged in the construction of public works, exclusive of maintenance work. Laborers, workmen and mechanics employed by contractors or subcontractors in the execution of any contract or contracts for public works with the State, or any officer or public body thereof, or in the execution of any contract or contracts for public works, with any County, City and County, City, Town, District or other political subdivision of this State, or any officer or public body thereof, shall be deemed to be employed upon public work.

SECTION 2. The public body awarding any contract for public work on behalf of the State, or on behalf of any County, City and County, City, Town, District or other political subdivision thereof, or otherwise undertaking any public work, shall ascertain the general prevailing rate of per diem wages in the locality in which the work is to be performed for each craft or type of workmen or mechanic needed to execute the contract, and shall specify in the call for bids for said contract, and in the contract itself, what the general prevailing rate of per diem wages in the said locality is for each craft or type of workmen needed to execute the contract, also the prevailing rate for legal holiday and overtime work, and it shall be needed to execute the contract, also the prevailing rate for legal holiday and overtime work, and it shall be mandatory upon the Contractor to whom the contract is awarded, and upon any subcontractor under him, to pay not less than the said specified rates to all laborers, workmen and mechanics employed by them in the execution of the contract. The Contractor shall forfeit as a penalty to the State, County, City and County, City, Town, District or other political subdivision on whose behalf the contract is made or awarded, Ten Dollars (\$10.00) for each laborer, workman or mechanic employed for each calendar day, or portion thereof, such laborer, workman or mechanic is paid less than the stipulated rates for any work done under said contract, by him, or by any subcontractor under him, and the said public body awarding the contract shall cause to be inserted in the contract a stipulation to this effect. It shall be the duty of such public body awarding the contract, and its agents and officers to take cognizance of complaints of all violations of the provisions of this Act committed in the course of the execution of the contract, and when making payments to the contractor of monies becoming due under said contract to withhold and retain therefrom all sums and amounts which shall have been forfeited pursuant to the herein said stipulation and the terms of this Act; provided, however, that no sum shall be so withheld, retained or forfeited, except from the final payment, without a full investigation by the awarding body. It shall be lawful for any contractor to withhold from any subcontractor under him sufficient sums to cover any penalties withheld from him by the awarding body on account of said subcontractor's failure to comply with the terms of this Act, and if payment has already been made to him the contractor may recover from him the amount of the penalty or forfeiture in a suit at law.

SECTION 3. The contractor and each subcontractor shall keep, or cause to be kept, an accurate record showing the names and occupations of all laborers, workmen and mechanics employed by him, in connection with the said public work, and showing the actual per diem wages paid to each of such workers, which record shall be open at all reasonable hours to the inspection of the public body awarding the contract, its officers and agents.

2. PREVAILING WAGE LEGAL REQUIREMENTS Continued:

SECTION 4. Any construction or repair work done under contract, and paid for in whole or in part out of public funds, other than work done directly by any public utility company pursuant to order of the Railroad Commission or other public authority, whether or not done under public supervision or direction or paid for wholly or in part out of public funds, shall be held to be “public works” within the meaning of political subdivision of this State in which the building, highway, road, excavation, or other structures, project, development or improvement is situated in all cases in which the contract is awarded by the State, or any public body thereof, and shall be held to mean the limits of the County, City and County, City, Town, District or other political subdivision on whose behalf the contract is awarded in all other cases. The term “general prevailing rate of per diem wages” shall be the rate determined upon as such rate by the public body awarding the contract, or authorizing the work, whose decision in the matter shall be final. Nothing in this act, however, shall be construed to prohibit the payment to any laborer, workman or mechanic employed on any public work as aforesaid of more than the said general prevailing rate of wages.

ARTICLE 5160. Bond for Wages:

Any person or persons, firm or corporation, entering into a formal contract with this State or its counties or school districts or other subdivisions thereof or any municipality therein for the construction of any public building, or the prosecution and completion of any public work shall be required, before, commencing such work, to execute the usual Penal Bond, with additional obligation that such contractor shall promptly make payments to all persons supplying him or them with labor and materials in the prosecution of the work provided for in such contract. Any person, company, or corporation who has furnished labor or materials used in the construction or repair of any public building or public work, and payment for which has not been made, shall have the right to intervene and be made a party to any action instituted by the State or any adjudicated in such action and judgment rendered thereon, subject, however, to the priority of the claims and judgment of the State or municipality.

If the full amount of the liability of the surety on said bond is insufficient to pay the full amount of said claims and demands, then, after paying the full amount due to the State or municipality, the remainder shall be distributed pro-rata among said intervenors. Provided, further, that all claims for labor and materials furnished to said Contractor, and all claims for labor and material furnished to any contractor shall be itemized and sworn to as required by Statutes as to mechanic’s lien claims, and such claims shall be filed with the County Clerk of the County, in which said work is being prosecuted, within ninety days from the date of the delivery of said material and the performance of said work. The County Clerk shall note on the mechanic’s lien record, the name of the claimant, the amount claimed, the name of the contractor and the name of the county, School District, other subdivisions, or municipality with which the contract was made; and the County Clerk shall index the claim under the name of the contractor and under the name of the County, School District, other subdivision or municipality; with which the contract was made.

Provided further, that after completion and acceptance of completed project all moneys due contractor under said contract shall be held by the state or its counties or school districts or other subdivision, thereof or an affidavit made by Contractor that all just bills for labor and material under this contract has been paid in full by the Contractor.

Acts 1913, P. 185; Acts 1929, 41st leg., P.4881. Ch. 22 paragraph 1.

GENERAL PREVAILING WAGE RATES

"General Decision Number: TX20190255 01/04/2019

Superseded General Decision Number: TX20180305

State: Texas

Construction Type: Building

County: Hidalgo County in Texas.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.60 for calendar year 2019 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.60 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2019. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/04/2019

BOIL0074-003 01/01/2017

	Rates	Fringes
BOILERMAKER.....	\$ 28.00	22.35

ENGI0178-005 06/01/2014

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
(1) Tower Crane.....	\$ 29.00	10.60
(2) Cranes with Pile Driving or Caisson		

OPERATOR: Grader/Blade.....	\$ 10.00	0.00
OPERATOR: Loader.....	\$ 12.87	0.70
OPERATOR: Mechanic.....	\$ 17.00	0.00
OPERATOR: Paver (Asphalt, Aggregate, and Concrete).....	\$ 16.03	0.00
OPERATOR: Roller.....	\$ 12.70	0.00
PAINTER (Brush, Roller, and Spray).....	\$ 11.27	0.00
PIPEFITTER.....	\$ 15.22	3.16
ROOFER.....	\$ 11.42	0.00
SHEET METAL WORKER (HVAC Duct Installation Only).....	\$ 18.40	2.12
SHEET METAL WORKER, Excludes HVAC Duct Installation.....	\$ 21.13	6.53
TILE FINISHER.....	\$ 11.22	0.00
TILE SETTER.....	\$ 12.15	0.00
TRUCK DRIVER: Dump Truck.....	\$ 12.39	1.18
TRUCK DRIVER: Flatbed Truck.....	\$ 19.65	8.57
TRUCK DRIVER: Semi-Trailer Truck.....	\$ 12.50	0.00
TRUCK DRIVER: Water Truck.....	\$ 12.00	4.11

WELDERS - Receive rate prescribed for craft performing
operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the

interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

EXHIBIT L-1

AFFIDAVIT AND WAIVER OF LIEN PRIME CONTRACTOR

STATE OF _____

COUNTY OF _____

Personally appeared before me, the undersigned Notary Public for said County and State
_____(Name of Individual),

_____(Title) of _____

(Prime Contractor), who being duly sworn by me states on oath that all product suppliers and Subcontractors, payrolls, sales tax, privilege tax or license, old age benefits tax, state and federal unemployment insurance, and other liabilities incurred in the performance of _____

(Type of Contract) Contract for the construction of improvements at **Project No. #** _____

Project Title _____ (**Name of Project**), have been paid in full and that the above named Prime Contractor waives any claims and released _____

(Owner) from any rights or claims (including lien rights) for debts due and owing by virtue of the furnishing of any labor, products, and supplies furnished for such improvements.

The above named Prime Contractor agrees to indemnify the Owner and save him harmless on account of any loss he may sustain in reliance upon this Affidavit and Waiver of Lien including the amount of any lien he may be compelled to pay all costs relating thereto and a reasonable attorney's fee.

(Prime Contractor)

By: _____
Type/Print Name

Title: _____

Date: _____

Sworn to and subscribed before me
this the ____ day of _____, 20__.

Notary Public

My Commission Expires: _____

EXHIBIT L-2

RELEASE AND WAIVER OF CLAIMS BY SUBCONTRACTORS AND PRODUCT VENDORS

STATE OF _____

COUNTY OF _____

Personally appeared before me the undersigned authority in and for said County and State (Name of Individual), _____ (Title) of _____ (Company), who, being duly sworn by me states on oath that all bills for labor and products, sales tax, privilege tax or license, old age benefits tax, state and federal unemployment insurance and other liability have been paid in full, or that funds are in hand to discharge such liabilities when due, incurred in the performance of its Subcontract for furnishing labor or products in the construction of improvements at **Project No. #** _____ **Project Title** _____
_____ **(Name of Project & Location)**, upon receipt of check in the amount \$ _____, the undersigned company waives any claims and releases (Owner) _____ (Contractor) from any rights or claims for debts due and owing by virtue of the furnishing of any labor or products and any lien therefore.

(Name of Company)

Signature: _____

By: _____
Type/Print Name

Title: _____

Date: _____

Sworn to and subscribed before me
this _____ day of _____, 20__.

Notary Public

My Commission Expires: _____

EXHIBIT L-3

CONTRACTOR'S AFFIDAVIT AS TO STATUS OF LIENS

STATE OF _____

COUNTY OF _____

Personally appeared before me, the undersigned Notary Public for said County and State,
_____(Name of Individual), _____ (Title), of _____ (Prime Contractor),
who being duly sworn by me states on oath that to the best of his knowledge and belief, except as
listed below, the Releases and Waivers of Claim attached hereto include all Subcontractors and all
suppliers of labor, products, and equipment provided by all persons who may have lien against the
property of _____ (Owner), **Project No. #__ Project Title _____**
_____, located at _____ (Location of Project),
arising out of the construction of improvements thereon.

Exceptions: (If none, write "NONE." Any exception listed shall be bonded by the Contractor to
indemnify the Owner, and a copy of each such bond shall be attached hereto.)

- 1.
- 2.
- 3.
- 4.

(Name of Company)

By: _____
Type/Print Name

Title: _____

Date: _____

Sworn to and subscribed before me
this ____ day of _____, 20____

Notary Public
My Commission Expires: _____

M. TECHNICAL SPECIFICATIONS

**CITY OF McALLEN
DEPARTMENT OF PUBLIC WORKS**

AUTOMOTIVE WAREHOUSE EXPANSION & ELEVATOR
McALLEN, TEXAS

PROJECT MANUAL

BIDDING DOCUMENTS
CONDITIONS OF CONTRACT FOR CONSTRUCTION
SPECIFICATIONS

JUNE 2019

OWNER: CITY OF McALLEN
1300 HOUSTON AVENUE
McALLEN, TEXAS 78501
P: (956) 681-3111

ARCHITECT: NEGRETE & KOLAR ARCHITECTS, LLP
204 EAST STUBBS STREET
EDINBURG, TEXAS 78539
P: (956) 386-0611

CIVIL ENGINEER: CITY OF McALLEN
1300 HOUSTON AVENUE
McALLEN, TEXAS 78501
P: (956) 681-3111

STRUCTURAL ENGINEER: CHANIN ENGINEERING, LLC
400 NOLANA AVENUE, SUITE H2
McALLEN, TEXAS 78504
P: (956) 687-9421

MEP ENGINEER: TRINITY MEP ENGINEERING
3533 MORELAND DRIVE, SUITE A
WESLACO, TEXAS 78596
P: (956) 973-0500

CITY OF McALLEN

DEPARTMENT OF PUBLIC WORKS

AUTOMOTIVE WAREHOUSE EXPANSION & ELEVATOR



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CITY OF McALLEN

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06-07-19

A handwritten signature in blue ink, appearing to read "M. Chanin".



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3533 Moreland Dr. Suite A | Weslaco, Texas 78596
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PART ONE

BIDDING DOCUMENTS

PART TWO

CONTRACT REQUIREMENTS

DOCUMENT 00 72 00
GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

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1 GENERAL PROVISIONS

1.1 BASIC DEFINITIONS

A. THE CONTRACT DOCUMENTS

The Contract Documents consist of the Agreement between Owner and Contractor (hereinafter the Agreement), The Project Manual including, Bidding Documents, Conditions of the Contract (General, Supplementary and other Conditions) and Specifications, Drawings, 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 Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include other documents such as bidding requirements (advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or portions of addenda relating to bidding requirements).

B. THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between 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 Architect and Contractor, (2) between the Owner and a Subcontractor or Sub-subcontractor or (3) between any persons or entities other than the Owner and Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties. The Contract provisions are complementary and what is called for by one shall be as binding as if called for by all. In the event of conflicts, explanatory notes in the drawings take precedence over graphic indications, detailed drawings take precedence over those of small scale and figured dimensions are to be adhered to though they may differ from scale measurements. In the absence of figured dimensions or in case of doubt as to proper measurements or in case of any discrepancies between dimensions and plans, the Architect is to be consulted. The Contractor shall verify all dimensions and conditions on site and of Work in place. Priority of interpretation shall be in the following order:

1. Signed Agreement
2. General Conditions of the Contract
3. Bidding Documents
4. Bid
5. Specifications
6. Drawings

C. THE WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all the 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.

D. 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 or by separate contractors.

E. THE DRAWINGS

The Drawings are the graphic and pictorial portions of the contract Documents, wherever located and whenever issued, showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

F. THE SPECIFICATIONS

The Specifications are the portion of the Contract Documents consisting of the written requirements for materials, equipment, construction systems, standards and workmanship for the Work, and performance or related services.

G. THE PROJECT MANUAL

The Project Manual is the volume usually assembled for the Work which may include the bidding requirements, sample forms, Conditions of the Contract and Specifications.

1.2 EXECUTION, CORRELATION AND INTENT

- A. The Contract Documents shall be signed by the Owner and Contractor as provided in the Agreement. If either the Owner or Contractor or both do not sign all the Contract Documents, the Architect shall identify such unsigned Documents upon request.
- B. Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become

familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

- C. 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.
- D. Organization of the Specifications into divisions, sections, parts, and article, 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.
- E. Unless otherwise stated in the Contract Documents, words which have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

1.3 OWNERSHIP AND USE OF ARCHITECTS DRAWINGS, SPECIFICATIONS AND OTHER DOCUMENTS

- A. The Drawings, Specifications and other documents prepared by the Architect are instruments of the Architect's service through which the Work to be executed by the Contractor is described. The Contractor may retain one contract record set. Neither the Contractor nor any Subcontractor, Sub-subcontractor or material or equipment supplier shall own or claim a copyright in the Drawings, Specifications and other documents prepared by the Architect, and unless otherwise indicated the Architect shall be deemed the author of them and will retain all common law, statutory and other reserved rights, in addition to the copyright. All copies of them, except the Contractor's record set, shall be returned or suitably accounted for to the Architect, on request, upon completion of the Work. The Drawings, Specifications and other documents prepared by the Architect, and copies thereof furnished to the Contractor, are for use solely with respect

to this project. They are not to be used by the Contractor or any Subcontractor, Sub-subcontractor or material or equipment supplier on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner and Architect. The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are granted a limited license to use and reproduce applicable portions of the drawings, Specifications and other documents prepared by the Architect appropriate to and for use in the execution of their Work under the Contract Documents. All copies made under this license shall bear the statutory copyright notice, if any, shown on the Drawings, Specifications and other documents prepared by the Architect. Submittal or distribution to meet official regulatory requirements or for other purpose in connection with the Project is not to be construed as publication in derogation of the Architect's copyright or other reserved rights.

1.4 CAPITALIZATION

- A. Terms capitalized in these General Conditions include those which are (1) specifically defined, (2) the titles of numbered articles and identified references to Paragraphs, subparagraphs and Clauses in the document or (3) the titles of other documents used or referenced in the Contract Documents.

1.5 INTERPRETATION

- A. 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.

2 OWNER

2.1 DEFINITION

- A. The Owner 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 term "Owner" means the Owner or the Owner's authorized representative.
- B. The Owner upon reasonable written request shall furnish to the Contractor in writing information which is necessary and

relevant for the Contractor to evaluate, give notice or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein at the time of execution of the agreement and, within five days after any change, information of such change in title, recorded or unrecorded.

2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

- A. The Owner shall, at the request of the Contractor, prior to execution of the Agreement and promptly from time to time thereafter, furnish to the Contractor reasonable evidence that financial arrangements have been made to fulfill the Owner's obligation under the Contract.
- B. The Owner shall furnish surveys describing physical characteristics, legal limitation and utility locations for the site of the project, and a legal description of the site.
- C. Except for permits and fees which are the responsibility of the contractor under the Contract Documents, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.
- D. Information or services under the Owner's control shall be furnished by the Owner with reasonable promptness to avoid delay in orderly progress of the Work.
- E. Unless otherwise provided in the Contract Documents, the Contractor will be furnished, free of charge, such copies of Drawings and Project Manuals as are reasonably necessary for execution of the Work.
- F. The foregoing are in addition to other duties and responsibility of the Owner enumerated herein and especially those in respect to Article 6 (Construction by Owner or by Separate Contractors), Article 9 (Payments and Completion) and Article 11 (Insurance and Bonds).

2.3 OWNER'S RIGHT TO STOP THE WORK

- A. If the Contractor fails to correct Work which is not in accordance with the requirements of the Contract Documents as required by Paragraph 12.2. or

persistently fails to carry out Work in accordance with the Contract Documents, the Owner by written order signed personally or by an agent specifically so empowered by the Owner in writing, may order 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, except to the extent required by Paragraph 6.1, Subparagraph C.

2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

- A.** If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a seven-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 after such seven-day period give the Contractor a second written notice to correct such deficiencies within a second seven-day period. If the Contractor within such second seven-day period after receipt of such second notice fails to commence and continue to correct any deficiencies, 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 cost of correcting such deficiencies, including compensation for the Architect's additional services and expenses 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.

3 CONTRACTOR

3.1 DEFINITION

- A.** 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 term "Contractor" means the Contractor

or the Contractor's authorized representative.

3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

- A.** The Contractor shall carefully study and compare Contract Documents with each other and with information furnished by the Owner pursuant to Paragraph 2.2, Subparagraph B, and shall at once report to the Architect errors, inconsistencies or omissions discovered. The Contractor shall not be liable to the Owner or Architect for damage resulting from errors, inconsistencies or omissions in the Contract Documents unless the Contractor recognized such error, inconsistency or omission and knowingly failed to report it to the Architect. If the Contractor performs any construction activity knowing it involves a recognized error, inconsistency or omission in the Contract Documents without such notice to the Architect, the Contractor shall assume appropriate responsibility for such performance and shall bear an appropriate amount of the attributable cost for correction.
- B.** The Contractor shall take field measurements and verify field conditions and shall carefully compare such field measurements and conditions and other information known to the Contractor with the Contract Document before commencing activities. Errors, inconsistencies or omissions discovered shall be reported to the Architect at once.
- C.** The Contractor shall perform the Work in accordance with the Contract Documents and submittals approved pursuant to paragraph 3.12.

3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

- A.** 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 Contract Documents give other specific instruction concerning these matters.
- B.** 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 performing portions of the Work under a contract with the Contractor.

- C. 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 other than the Contractor.
- D. The Contractor shall be responsible for inspection of portions of work already performed under this Contract to determine that such portions are in proper condition to receive subsequent Work.

3.4 LABOR AND MATERIALS

- A. 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.
- B. The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Contract. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.

3.5 WARRANTY

- A. The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless otherwise required or permitted by the Contract Documents, that the Work will be free from defects not inherent in the quality required or permitted and that the Work will conform with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The Contractor's warranty excludes remedy for damage or defects caused by abuse, modifications not executed by the Contractor, improper or insufficient maintenance, improper

operation, or normal wear and tear under normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

3.6 TAXES

- A. The Contractor shall pay taxes for the Work or portions thereof provided by the Contractor which are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.
- B. This Contract is to be performed for an exempt organization as defined by title 2, subtitle E; chapter 151 of the Texas Limited Sales, excise and use tax act and section 151.311 of State Statutes. The Owner will furnish the Contractor proof of certificate of exemption upon request.

3.7 PERMITS, FEES AND NOTICE

- A. Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit and other permits and government fees, licenses and inspections necessary for proper execution and completion of the Work which are customarily secured after execution of the Contract and which are legally required when bids are received or negotiations concluded.
- B. The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations and lawful orders of public authorities bearing on performance of the Work.
- C. It is not the Contractor's responsibility to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, building codes, and rules and regulations. However, if the Contractor observes that portions of the Contract Documents are at variance therewith, the Contractor shall promptly notify the Architect and Owner in writing, and necessary changes shall be accomplished by appropriate Modification.
- D. If the Contractor performs Work knowing it to be contrary to laws, statutes, ordinances, building codes, and rules and regulations without such notice to the Architect and Owner, the Contractor shall assume full responsibility for such Work and shall bear the attributable costs.

3.8 ALLOWANCES

- A. 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 against which the Contractor makes reasonable objections.
- B. Unless otherwise provided in the Contract Documents:
 - .1 materials and equipment under an allowances shall be selected promptly by the Owner to avoid delay in the Work.
 - .2 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trader discounts;
 - .3 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowances amounts shall be included in the Contract sum and not in the allowances.
 - .4 whenever costs are more than or less than allowances, 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 Paragraph 3.8, Subparagraph B, Clause .2, and (2) changes in Contractor's costs under Clause .3 in that same Subparagraph.

3.9 SUPERINTENDENT

- A. 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 shall be as binding as if given to the Contractor. Important communications shall be confirmed in writing. Other communications shall be similarly confirmed on written request in each case.

3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

- A. The Contractor, promptly after being awarded the Contract, 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.

- B. The Contractor shall prepare and keep current, for the Architect's approval, a schedule of submittals which is coordinated with the Contractor's construction schedule and allows the Architect reasonable time to review submittals.
- C. The Contractor shall conform to the most recent schedules. A submittal schedule shall be submitted along with the construction schedule as well as a list of materials, vendors and sub-contractors. The submittal schedule shall be integrated into the construction schedule and updated monthly with the monthly application for payment.

3.11 DOCUMENTS AND SAMPLES AT THE SITE

- A. The Contractor shall maintain at the site for the Owner one record copy of the drawings, Specifications, addenda, Change Orders and other Modifications, in good order and marked currently to record changes and selections made during construction, and in addition 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.

3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

- A. Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or Subcontractor, Sub-subcontractor, manufacturers, supplier or distributor to illustrate some portion of the Work.
- B. 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.

- C. Samples are physical examples which illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.
- D. Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. The purpose of their submittal is to demonstrate for those portions of the Work for which submittals are required the way the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents. Review by the Architect is subject to the limitations of Paragraph 4.2, subparagraph G.
- E. The Contractor shall review, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents 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. Accordingly, the Contractor must submit a submittal schedule to advise the Architect of his intended submittal deliveries and relation to the Construction schedule produced by the Contractor. Incomplete and non-compliant submittals shall be considered non-responsive and not a hindrance to the Contractor's construction schedule regardless of the review time encumbered. Submittals made by the Contractor which are not required by the Contract Documents may be returned without action.
- F. The Contractor shall perform no portion of the Work requiring submittal and review of Shop Drawings, Product Data, Samples and similar submittals until the respective submittal has been approved by the Architect. Such Work shall be in accordance with approved submittals.
- G. By approving and submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents that the Contractor has determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

- H. 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 the Architect has given written approval to the specific 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.
- I. The Contractor shall direct specific attention, in writing or on re-submitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals.
- J. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents.
- K. When professional certification or performance criteria of materials, systems or equipment is required by the Contract Documents, The Architect shall be entitled to rely upon the accuracy and completeness of such calculations and certifications.

3.13 USE OF SITE

- A. The Contractor shall confine operations at the site to areas permitted by law, ordinances, permits and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

3.14 CUTTING AND PATCHING

- A. The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly.
- B. 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

- A. 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 from and about the Project waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials.
- B. If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the cost thereof shall be charged to the Contractor.

3.16 ACCESS TO WORK

- A. The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

3.17 ROYALTIES AND PATENTS

- A. The Contractor shall pay all royalties and licenses fees. The Contractor shall defend suits or claims for infringement of 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. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a patent; the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

3.18 INDEMNIFICATION

- A. To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's Consultants, and agents and employees of any of them from and against claims, damages, losses and expense, including but not limited to attorney's fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expenses is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property

(other than the Work itself) including loss of use resulting therefrom, but only to the extent caused in whole or in part by negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Paragraph 3.18.

- B. In claims against any person or entity indemnified under this paragraph 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under this paragraph 3.18 shall not be limited by a limitation on amount or type of damages, compensation or benefit payable by or for the Contractor or a Subcontractor under worker's or workmen's compensation acts, disability benefit acts or other employee benefit acts.
- C. The obligations of the Contractor under this Paragraph 3.18 shall not extend to the liability of the Architect, the Architect's consultants, and agents and employees of any of them arising out of (1) the preparation or approval of maps, drawings, opinions, reports, surveys, Change Orders, designs or specifications, or (2) the giving of or the failure to give directions or instructions by the Architect, the Architect's consultants, and agents and employees of any of them provided such giving or failure to give is the primary cause of the injury or damage.

4 ADMINISTRATION OF THE CONTRACT

4.1 ARCHITECT

- A. The Architect is the person lawfully licensed to practice architecture or an entity lawfully practicing architecture identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The term "Architect" means the Architect or the Architect's authorized representative.
- B. 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.

- C. In case of termination of employment of the Architect, the Owner shall appoint an architect against whom the Contractor makes no reasonable objection and whose status under the Contract Documents shall be that of the former architect.
- D. Disputes arising under Paragraph 4.1, Subparagraphs B and C, shall be subject to arbitration.

4.2 ARCHITECT'S ADMINISTRATION OF THE CONTRACT

- A. The Architect will provide administration of the Contract as described in the Contract Documents, and will be the Owner's representative (1) during construction, (2) until final payment is due and (3) with the Owner's concurrence, from time to time during the correction period described in paragraph 12.2. The Architect will advise and consult with the Owner. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, unless otherwise modified by written instruments in accordance with other provisions of the Contract.
- B. the Architect will visit the site at intervals appropriate to the stage of construction to become generally familiar with the progress and quality of the completed Work and to determine in general if the Work is being performed in a manner indicating that the Work, when completed, will be in accordance with Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check quality or quantity of the Work. On the basis of on-site observations as an architect, the Architect will keep the Owner informed of progress of the work, and will endeavor to guard the Owner against defects and deficiencies in the work.
- C. The Architect will not have control or charge of and will not be responsible for construction means, methods techniques, sequences or procedures, or for safety precautions and programs in connection

with Work, since these are solely the Contractor's responsibility as provided in Paragraph 3.3. The Architect will not be responsible for the Contractor's failure to carry out the work in accordance with the Contract Documents. The Architect will not have control over or change of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or of any other persons performing portions of the Work.

- D. **Communication Facilitating 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 communicate through 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.
- E. Based on the Architect's observations and evaluations of the Contractor's applications for payment the Architect will review and certify the amounts due to the Contractor and will issue Certificates for Payment in such amount.
- F. The Architect will have authority to reject Work which does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable for implementation of the intent of the Contract Documents, the Architect will have authority to require additional inspection or testing of the work in accordance with Paragraph 13.5, subparagraphs A and B, 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 to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons performing portions of the Work.
- G. 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 with such reasonable promptness as to cause no delay in the Work or in the activities of the Owner, Contractor or separate contractors, while allowing sufficient time in the Architect's professional judgment to permit adequate review. Accordingly, the Contractor must submit a submittal schedule to advise the Architect of his intended submittal deliveries and relation to the Construction schedule produced by the Contractor. Incomplete and non-compliant submittals shall be considered non-responsive and not a hindrance to the Contractor's construction schedule regardless of the review time encumbered. 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 Paragraphs 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.

- H. The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Paragraph 7.4.
- I. The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion, will 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, and will issue a final Certificate for Payment upon

compliance with the requirements of the Contract Documents.

- J. If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibility at the site. The duties responsibilities and limitations of authority of such project representative shall be as set forth in an exhibit to be incorporated in the Contract Documents.
- K. 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 request will be made with reasonable promptness and within any time limits agreed upon. If no agreement is made concerning the time within which interpretations required of the Architect shall be furnished in compliance with this paragraph 4.2., then delay shall not be recognized on account of failure by the Architect to furnish such interpretation until 15 days after written request is made for them. Contractor's requests for information or interpretation shall be issued and considered valid only for verifiable lack of information in the contract documents.
- L. 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. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions so rendered in good faith.
- M. the Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

4.3 CLAIMS AND DISPUTES

- A. **Definitions.** A claim is a demand or assertion by one of the parties seeking, as a matter of right, adjustment or interpretation of Contract terms, payment of money, and extension of time or other relief with respect to the terms of the Contract. The term "Claims" also includes other disputes and matters in question

between the Owner and Contractor arising out of or relating to the Contract. Claims must be made by written notice. The responsibility to substantiate Claims shall rest with the party making the Claims.

- B. Decision of Architect.** Claims, including those alleging an error or omission by the Architect shall be referred initially to the Architect for action as provided in Paragraph 4.4. A decision by the Architect, as provided in Subparagraph D of Paragraph 4.4 shall be required as a condition precedent to arbitration or litigation of a Claim between the Contractor and Owner as to all such matters arising prior to the date final payment is due, regardless of (1) whether such matters relate to execution and progress of the Work or (2) the extent to which the Work has been completed. The decision by the Architect in response to a Claim shall not be a condition precedent to arbitration or litigation in the event (1) the position of Architect is vacant, (2) the Architect has not received evidence or has failed to render a decision within agreed time limits, (3) the Architect has failed to take action required under Subparagraph D of Paragraph 4.4 within 30 days after the Claim is made, (4) 45 days have passed after the Claim has been referred to the Architect or (5) the Claim relates to a mechanic's lien.
- C. Time Limits on Claims.** Claims by either party must be made within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later. Claims must be made by written notice. An additional Claim made after the initial Claim has been implemented by Change Order will not be considered unless submitted in a timely manner.
- D. Continuing contract Performance.** Pending final resolution of a Claim including arbitration, unless otherwise agreed in writing the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.
- E. Waiver of Claims: Final Payment.** The making of final payment shall constitute a

waiver of Claims by the Owner except those arising from:

- .1 liens, 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 special warranties required by the Contract Documents.

- F. Claims for Concealed or Unknown Conditions.** If conditions are encountered at the site which are (1) subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, which differ materially from those ordinarily found to exist in construction activities of the character provided for in the Contract Documents, then notice by the observing party shall be given to the other party promptly before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if 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 recommend an equitable adjustment in the contract Sum or Contract Time, or both. If the Architect 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 Architect shall so notify the Owner and Contractor in writing, stating the reasons. Claims by either party in opposition to such determination must be made within 21 days after the Architect has given notice of the decision. If the Owner and Contractor cannot agree on an adjustment in the Contract Sum or Contract Time, the adjustment shall be referred to the Architect for initial determination, subject to further proceeding pursuant to paragraph 4.4.

- G. Claims for Additional Cost.** If the Contractor wishes to make claims 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 Paragraph 10.3. If the Contractor believes additional cost is involved for reasons including but not limited to (1) a written interpretation from the Architect, (2) an order by the Owner to stop the Work where the Contractor was not at fault, (3) a written order for a minor change in the Work issued by the Architect, (4) failure of payment by the Owner, (5) termination of the Contract by the Owner, (6) Owner's suspension or (7) other reasonable grounds, Claim shall be filed in accordance with the procedure established herein.

H. Claims for Additional Time.

- .1 If the contractor wishes to make 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 continuing delay only one Claim is necessary.
- .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 and could not have been reasonably anticipated and that weather conditions had an adverse effect on the scheduled construction.

- I. Injury or Damage to Person or Property.** If either party to the Contract suffers injury or damage to person or property because of an act or omission of the other party, of any of the other party's employees or agents, or of others for whose acts such party is legally liable, 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 first observance. The notice shall provide sufficient detail to enable the other party to investigate the matter. If a Claim for additional cost or time related to this Claim is to be asserted, it shall be filed as provided in subparagraphs G and H of Paragraph 4.3.

4.4 RESOLUTION OF CLAIMS AND DISPUTES

- A.** The Architect will review Claims and take one or more of the following preliminary actions within ten days of receipt of a Claim: (1) request additional supporting data from the claimant, (2) submit a schedule to the parties indicating when the Architect expects to take action, (3) reject the Claim in whole or in part, stating reasons for rejection, (4) recommend approval of the Claim by the other party or (5) suggest a compromise. The Architect may also, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim.
- B.** If a Claim has been resolved, the Architect will prepare or obtain appropriate documentation.
- C.** If a Claim has not been resolved, the party making the Claim shall, within ten days after the Architect's preliminary response, take one or more of the following actions: (1) submit additional supporting data request by the Architect, (2) modify the initial Claim or (3) notify the Architect that the initial Claim stands.
- D.** If a Claim has not been resolved after consideration of the foregoing and of further evidence presented by the parties or requested by the Architect, the Architect will notify the parties in writing that the Architect's decision will be made within seven days, which decision shall be final and binding on the parties but subject to arbitration. Upon expiration of such time period, the Architect will render to the parties the Architect's written decision relative to the Claim, including any change in the Contract Sum or Contract Time or both. If there is a surety and there appears to be a possibility of a Contractor's default, the Architect may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

4.5 DISPUTE RESOLUTION (MEDIATION)

- A. Controversies and Claims Subject to Mediation.** Any controversy or Claim arising out of or related to the Contract, or the breach thereof, shall be settled by Non-binding Mediation. Non-Binding Mediation shall only be utilized with the mutual consent of both parties. A neutral, trained, third party acceptable to both contract parties shall be secured and cost of such services shared to render an

opinion. Such opinion though shall not be binding and each party shall retain all legal rights to remedy. Mediation shall be utilized except for controversies or claims relating to aesthetic effect and except those waived as provided for in Subparagraph E of Paragraph 4.3. Such controversies or Claims upon which the Architect has given notice and rendered a decision as provided in Subparagraph D of Paragraph 4.4 shall be subject to mediation upon written demand of either party. Mediation may be commenced when 45 days have passed after a Claim has been referred to the Architect as provided in Paragraph 4.3. and no decision has been rendered.

- B. Neutral Selection.** Said neutral party should, if possible, be a local person with background in dispute resolution, law, and public work service. If the contract parties cannot agree on a third party neutral, then each party may pursue all legal avenues available under applicable law. Claims between the Owner and Contractor not resolved under Paragraph 4.4. shall, if subject to mediation under subparagraph A of Paragraph 4.5, be decided by mediation. Notice of demand for mediation shall be filed in writing with the other party to the Agreement between the Owner and Contractor, and a copy shall be filed with the Architect.
- C. Contract Performance During Mediation.** During mediation proceedings, the Owner and Contractor shall comply with Subparagraph D of Paragraph 4.3.
- D. When Mediation May Be Demanded.** Demand for mediation of any Claim may not be made until the earlier of (1) the date on which the Architect has rendered a final written decision on the Claim (2) the tenth day after the parties have presented evidence to the Architect or have been given reasonable opportunity to do so. If the Architect has not rendered a final written decision by that date, or (3) any of the five events described in Subparagraph B of Paragraph 4.3.
 - .1 When a written decision of the Architect states that (1) the decision is final but subject to mediation and (2) a demand for mediation of a Claim covered by such decision must be made within 30 days after

the date on which the party making the demand receives the final written decision, then failure to demand mediation within said 30 days' period shall result in the Architect's decision becoming final and binding upon the Owner and Contractor. If the Architect renders a decision after mediation proceedings have been initiated, such decision may be entered as evidence, but shall not supersede mediation proceedings unless the decision is acceptable to all parties concerned.

- .2 A demand for Mediation shall be made within the time limits specified in subparagraphs A and D, and Clause .1 of Paragraph 4.5. as applicable, and in other cases within a reasonable time after the Claim has arisen, and in no event shall it be made after the date when institution of legal or equitable proceedings based on such Claim would be barred by the applicable statute of limitations as determined pursuant to paragraph 13.7.
- E. Limitations on Consolidation or Joinder.** No mediation arising out of or relating to the Contract Documents shall include, by consolidation or joinder or in any other manner, the Architect, the Architect's employees or consultants, except by written consent containing specific references to the Agreement and signed by the Architect, Owner, Contractor and any other person or entity sought to be joined. No mediation shall include, by consolidation or joinder or in any other manner, parties other than the Owner, Contractor, a separate contractor as described in Article 6 and other persons substantially involved in a common question of fact or law whose presence is required if complete relief is to be accorded in mediation. No person or entity other than the Owner, Contractor or a separate contractor as described in Article 6 shall be included as an original third party or additional third party to a mediation whose interest or responsibility is insubstantial. Consent to Mediation involving an additional; person or entity shall not constitute consent to mediation

of a dispute not described therein or with a person or entity not named or described therein. The foregoing agreement to mediate and other agreements to mediate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

- F. **Claims and Timely Assertion of Claims.** A party who files a notice of demand for mediation must assert in the demand all Claims then known to that party on which mediation is permitted to be demanded. When a party fails to include a Claim through oversight, inadvertence or excusable neglect, or when a Claim has matured or been acquired subsequently, the mediator may permit amendment.
- G. **Judgment on Final Award.** The award rendered by the mediator shall be final if acceptable to both parties.

5 SUBCONTRACTORS

5.1 DEFINITIONS

- A. 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.
- B. 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.
- C. The Contractor shall not execute an agreement with any subcontractor or permit any subcontractor to perform any work included in this contract until he has verified the subcontractor as eligible to participate in federally funded contracts.
- D. 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 performing portions of the

Work under a contract with the Contractor.

- E. No Proposed subcontractor shall be disapproved by the Owner except for cause.
- F. The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work and required compliance by each subcontractor with the applicable provisions of the Contract.
- G. Nothing contained in the Contract shall create any contractual relation between any subcontractor and the Owner.

5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

- A. Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect will promptly reply to the contractor in writing stating whether or not the Owner or the Architect, after due investigation, has reasonable objection to any such proposed person or entity. Failure of the Owner or Architect to reply promptly shall constitute notice of no reasonable objection.
- B. The Contractor shall not contract with a proposed person or entity to which the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.
- C. If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. The Contract Sum shall be increased or decreased by the difference in cost occasioned by such change and an appropriate Change Order shall be issued. However, no increase in the Contract Sum shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.
- D. The Contractor shall not change a Subcontractor, person or entity previously

selected if the Owner or Architect makes reasonable objection to such change.

5.3 SUBCONTRACTUAL RELATIONS

- A. By appropriate agreement, written where legally required for validity, 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 which the Contractor, by these documents, assumes toward the Owner and Architect. 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 which may be at variance with the Contract Documents. Subcontractors shall similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

- A. Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner provided that:
- .1 Assignment is effective only after termination of the Contract by the Owner for cause pursuant to Paragraph 14.2 and only for those subcontract agreements which the Owner accepts by notifying the Subcontractor in writing; and

- .2 Assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

- B. If the Work has been suspended for more the 30 days, the Subcontractor's compensation shall be equitably adjusted.

6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

- A. 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 elsewhere in the Contract Documents.
- B. 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.
- C. The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules when directed to do so. The Contractor shall make any revisions to the construction schedule and Contract Sum 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.
- D. Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the

same rights which apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

6.2 MUTUAL RESPONSIBILITY

- A.** The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of the their activities and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.
- B.** 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 Architect 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.
- C.** Cost caused by delays or by improperly timed activities or defective construction shall be borne by the party responsible therefor.
- D.** The Contractor shall promptly remedy damage wrongfully caused by the Contractor to completed or partially completed construction or to property of the Owner or separate contractors as provided in Subparagraph E of Paragraph 10.2
- E.** Claims and other disputes and matters in question between the Contractor and a separate contractor shall be subject to the provisions of Paragraph 4.3 provided the separate contractor has reciprocal obligations.
- F.** The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Paragraph 3.14.

6.3 OWNER'S RIGHT TO CLEAN UP

- A.** If a dispute arises among 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 as described in Paragraph 3.15, the Owner may clean up and allocate the cost among those responsible as the Architect determines to be just.

7 CHANGES IN THE WORK

7.1 CHANGES

- A.** 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.
- B.** 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 Architect alone.
- C.** 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.
- D.** If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are so changed in a proposed Change Order or Construction Change Directive 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.

7.2 CHANGE ORDERS

- A.** A change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect, stating their agreement upon all of the following:
 - .1** a change in the Work;
 - .2** the amount of the adjustment in the Contract Sum, if any; and

.3 the extent of the adjustment in the Contract Time, if any.

- B. Methods used in determining adjustments to the Contract Sum may include those listed in Subparagraph C of Paragraph 7.3.

7.3 CONSTRUCTION CHANGE DIRECTIVES

- A. A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work and stating a proposed basis for 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.
- B. A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.
- C. 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 mutual acceptable fixed or percentage fee; or
 - .4 as provided in Subparagraph F of Paragraph 7.3.
- D. 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.
- E. A Construction Change Directive signed by the Contractor indicates the agreement of the Contractor 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.

- F. If the Contractor does not respond promptly or disagrees with the method for adjustment in the contract Sum, the method and the adjustment shall be determined by the Architect on the basis of reasonable expenditures and saving of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, a reasonable allowance for overhead and profit. In such case, and also under clause 33, Subparagraph C, Paragraph 7.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided on the Contract Documents, costs for the purpose of this Subparagraph F 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 or workmen's compensation insurance;
- .2 costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;
- .3 rental cost of machinery and equipment, exclusive of hand tools, whether rented from the contractor or others;
- .4 Cost 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.

- G. Pending final determination of cost to the Owner, amounts not in dispute may be included in Applications for Payment. The amount of credit to be allowed by the Contractor to the Owner for a deletion or change which results in a net decrease in the Contract Sum shall be actual net cost as confirmed by 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.

- H. If the Owner and Contractor do not agree with the adjustment in Contract Time or the method for determining it, the adjustment or the method shall be referred to the Architect for determination.
- I. When the Owner and Contractor agree with the determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and shall be recorded by preparation and execution of an appropriate Change Order.

7.4 MINOR CHANGES IN THE WORK

- A. The Architect will have 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. Such changes shall be effected by written order and shall be binding on the Owner and Contractor. The Contractor shall carry out such written orders promptly.

8 TIME

8.1 DEFINITIONS

- A. Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.
- B. The date of commencement of the Work is the date established in the Agreement. The date shall not be postponed by the failure to act of the Contractor or of persons or entities for which the Contractor is responsible.
- C. The date of Substantial Completion is the date certified by the Architect in accordance with Paragraph 9.8.
- D. The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

8.2 PROGRESS AND COMPLETION

- A. Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.
- B. 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. The date of commencement of the Work shall not be changed by the effective date of such insurance. Unless the date of commencement is established by a notice to proceed given by the Owner, the Contractor shall notify the Owner in writing not less than five days or other agreed period before commencing the Work to permit the timely filing of mortgages, mechanic's liens and other security interests.

- C. The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

8.3 DELAYS AND EXTENSIONS OF TIME

- A. If the Contractor is delayed at any time in progress of the Work by an act or neglect of the Owner or Architect, or of and 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 arbitration, or by other causes which the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.
- B. Claims relating to time shall be made in accordance with applicable provisions of Paragraph 4.3.
- C. This Paragraph 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.
- D. If Contractor fails to achieve Substantial Completion of the Work (or any portion thereof) on or before the date(s) specified for Substantial Completion in the Agreement, Contractor shall pay to the Owner, as **liquidated damages**, the sum of **\$500.00 (Five Hundred Dollars)** for each calendar day that Substantial Completion is delayed after the date(s) specified for Substantial Completion. By executing the Agreement the Contractor confirms and agrees that:

1. the liquidated damages to which Owner is entitled hereunder are a reasonable forecast of just compensation for the harm that would be caused by Contractor's failure to achieve Substantial Completion of the Work (or any portion thereof) on or before the date(s) specified for Substantial Completion in the Agreement;
2. the harm that would be caused by such failure, which includes loss of expected use of the project areas, provision of alternative storage facilities and rescheduling of move-in and occupancy dates, is one that is incapable or very difficult of accurate estimation; and
3. the harm that would be caused by such failure cannot be reasonably forecast because it would include business disruption to Owner in addition to loss of expected use of the project areas, provision of alternative storage facilities and rescheduling of moving and occupancy dates.

9 PAYMENTS AND COMPLETION

9.1 CONTRACT SUM

- A. 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

- A. Before the first Application for Payment, the Contractor shall submit to the Architect a schedule of values allocated to various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy as the Architect, may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. The schedule of values must be apportioned into the various portions of the work into labor and material categories as determined necessary by the Architect.

9.3 APPLICATIONS FOR PAYMENT

- A. At least ten (10) working days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for

Payment for operations completed in accordance with the schedule of values. 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 reflecting retainage if provided for elsewhere in the Contract Documents.

- .1 Such applications may include requests for payment on account of changes in the Work which have been properly authorized by Construction Change Directives but not yet included in Change Orders.
- .2 Such applications may not include requests for payment of amounts the contractor does not intend to pay to a Subcontractor or material supplier because of a dispute or other reason.

- B. 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 of 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 applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.
- C. 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, claims, security interest or encumbrances in favor of the Contractor, Subcontractor, material

suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

9.4 CERTIFICATES FOR PAYMENT

- A.** The Architect will, within ten (10) working days excluding all recognized federal holidays after receipt of original signed copy 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 Subparagraph A of Paragraph 9.5.
- B.** The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's observations at the site and the data comprising the Application for Payment, that the Work has progressed to the point indicated and that, to the best of the Architects knowledge, information and belief, 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 test and inspections, to minor deviations from the Contract Documents correctable prior to completion and to specific qualifications expressed by the Architect. The issuance of the 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 or 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

- A.** The Architect may decide not to certify payment and may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Subparagraph B of Paragraph 9.4 cannot be made. If the Architect is unable to certify payment in the amount of the application, the Architect will notify the Contractor and Owner as provided in Subparagraph A of Paragraph 9.4. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also decide not to certify payment or, because of subsequently discovered evidence or subsequent observations, may nullify the whole or part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss 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 another contractor;
 - .6** reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
 - .7** persistent failure to carry out the Work in accordance with the Contract Documents.
- B.** When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

9.6 PROGRESS PAYMENTS

- A. After the Architect has issued a Certificate for Payment; the Owner shall make payment in the manner and within the time provided in the Contract Documents and shall so notify the Architect.
- B. The Contractor shall promptly pay each Subcontractor, upon receipt of payment from the Owner, out of the amount paid to the Contractor on account of such Subcontractor's portion of the Work, the amount to which said Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of such Subcontractors portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in similar manner.
- C. The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.
- D. 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.
- E. Payment to material suppliers shall be treated in a manner similar to that provided in subparagraphs B, C, and D of Paragraph 9.6.
- F. 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

- A. If the Architect does not issue a Certificate for Payment through no fault of the Contractor, within twelve working days excluding recognized federal holidays after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within fifteen days after the date established in the Contract Documents the amount certified by the Architect or awarded by arbitration, then the Contractor may, upon seven additional days' written notice

to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, which shall be accomplished as provided in article 7.

9.8 SUBSTANTIAL COMPLETION

- A. 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 the Owner can occupy or utilize the Work for its intended use.
- B. 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 Architect a comprehensive list of items to be completed or corrected. The Contractor shall proceed promptly to complete and correct items on the list. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all work in accordance with the Contract Documents. Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not in accordance with the requirements of the Contract Documents, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. The Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion. When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion which 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. 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. 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.

- C. Upon Substantial Completion of the Work or designated portion thereof and upon application by the contractor and certification by the Architect, The Owner shall make payment, reflecting adjustment in retainage, if any, for such Work or portion thereof as provided in the Contract Document.

9.9 PARTIAL OCCUPANCY OR USE

- A. 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 Subparagraph K of Paragraph 11.3 and authorized by public authorities having jurisdiction over the Work. 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 Subparagraph B of Paragraph 9.8. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

- B. Immediately prior to such 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.
- C. Unless otherwise agreed upon, 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

- A. Upon receipt of written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly 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 observations 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 said final Certificate is due and payable. the Architect's final Certification for Payment will constitute a further representation that conditions listed in Subparagraph B of Paragraph 9.10 as precedent to the Contractor's being entitled to final payment have been fulfilled.
- B. Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that the insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be cancelled 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, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interest or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorney's fees

- C. If, after Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for the portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims. The making of final payment shall constitute a waiver of claims by the Owner as provided in Subparagraph E of Paragraph 4.3
- D. Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by the payee except those previously made in writing and identified by that payee as unsettled at the time of final

Application for Payment. Such waivers shall be in addition to the waiver described in Subparagraph E of Paragraph 4.3.

10 PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY PRECAUTIONS AND PROGRAMS

- A. The contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.
- B. In the event the Contractor encounters on the site material reasonably believed to be asbestos or polychlorinated biphenyl (PCB) which has not been rendered harmless, the Contractor shall immediately stop Work in the area affected and report the condition to the Owner and Architect in writing. The Work in the affected area shall not thereafter be resumed except by written agreement of the Owner and Contractor if in fact the material is asbestos or polychlorinated biphenyl (PCB) and has not been rendered harmless. The Work in the affected area shall be resumed in the absence of asbestos or polychlorinated biphenyl (PCB), or when it has been rendered harmless, by written agreement of the Owner and Contractor, or in accordance with final determination by the Architect on which arbitration has not been demanded, or by arbitration under Article 4.
- C. The Contractor shall not be required pursuant to Article 7 to perform without consent any Work, relating to asbestos or polychlorinated biphenyl (PCB).
- D. To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the contractor, Architect, Architect's Consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorney's fees, arising out of or resulting from performance of the Work in the affected area if in fact the material is asbestos or polychlorinated biphenyl (PCB) and has not been rendered harmless, provided that such claim, damage loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including loss of use resulting therefrom but only to the extent

caused in whole or in part by negligent acts or omissions of the Owner, anyone directly or indirectly employed by the Owner or anyone for whose acts the Owner may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnify which would otherwise exist as to a party or person described in this Subparagraph 10.1.4.

10.2 SAFETY OF PERSONS AND PROPERTY

- A. 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.
- B. The Contractor shall give notices and comply with applicable laws, ordinance, rules, regulations and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.
- C. 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.
- D. When use or storage of explosives or other hazardous materials or equipment or unusual methods is necessary for execution of the Work, the contractor shall exercise utmost care and carry on such

activities under supervision of properly qualified personnel.

- E. 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 Clauses .2 and .3, Subparagraph A, Paragraph 10.2 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 Clauses .2 and .3, Subparagraph A, Paragraph 10.2, 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 Paragraph 3.18.
- F. 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.
- G. The contractor shall not load or permit any part of the construction or site to be loaded so as to endanger its safety.

10.3 EMERGENCIES

- A. 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 claimed by the Contractor on account of an emergency shall be determined as provided in Paragraph 4.3. and Article 7.

11 SANITARY FACILITIES

- A. The Contractor shall furnish, install and maintain ample sanitary facilities for the workmen. As the needs arise, a sufficient number of enclosed temporary toilets shall be conveniently placed as required. Drinking water shall be provided from an approved source, so piped or transported as to keep it safe and fresh and served

from single service containers or satisfactory types of sanitary drinking fountains. All such facilities and services shall be furnished in strict accordance with existing and governing health regulations.

12 INSURANCE AND BONDS

12.1 CONTRACTOR'S INSURANCE

- A.** Contractor shall, at his sole expense, maintain in effect at all times during the full term of the work under the Contract Documents and as otherwise required under the Contract Documents, insurance coverages with limits not less than those set forth below in the schedule of insurance coverages (and in paragraph 12.3. hereof) with insurers licensed to do business in the State of Texas. None of the requirements contained herein as to types, limits or Owner's approval of insurance coverage to be maintained by contractor is intended to and shall not in any manner limit, qualify or quantify the liabilities and obligations assumed by the Contractor under the Contract Documents or otherwise provided by law. In the event of any failure by the Contractor to comply with the provisions of this Article 12, Owner may, without in any way compromising or waiving any right or remedy at law or in equity, on notice to Contractor, purchase such insurance, at Contractor's expenses, provided that Owner shall have no obligation to do so and if Owner shall do so, Contractor shall not be relieved of or excused from obligation to obtain and maintain such insurance amounts and coverages.

12.2 SCHEDULE OF INSURANCE COVERAGES

- A.** Minimum limits of insurance coverage shall be as follows:
- 1.** Workmen's Compensation and Employer's Liability:
 - \$500,000 each accident
 - \$500,000 disease policy limit
 - \$500,000 disease each employee
 - 2.** Comprehensive General Liability:
 - \$500,000 per occurrence
 - \$500,000 products/completed operation
 - \$1,000,000 policy aggregate No Claims Made coverage Acceptable
 - 3.** Automobile Liability:

\$500,000 combined single limit

- 4.** General Umbrella Policy

\$1,000,000 single limit umbrella

B. BROAD FORM BOILER AND MACHINERY INSURANCE

- .1** Contractor shall maintain, at his sole expense, such boiler and machinery insurance as may be required by the Contract Documents or by law. This insurance shall include the interest of Owner, Contractor and Subcontractors in the Work as set forth (in Subparagraph 12.3.1. below)

C. PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND

- .1** Contractor shall obtain, and shall require each Subcontractor designated by Owner to obtain, a performance bond and labor and material payment bond in the amount of 100% of the contract sum in the case of Contractor, and 100% of the applicable contract amount for each designated Subcontractor. Contractor shall deliver the executed originals and two executed copies of each of its required bonds to Owner not later than the date of execution of the agreement and deliver the executed originals and two executed copies of each of the required Subcontractor bonds to Owner not later than the date of execution of the Subcontractor bond with any such Subcontractor.
- .2** The bonds shall in all respects conform to, the requirements of the laws of the State of Texas.
- .3** The surety furnishing the bonds required under Subparagraph F, Paragraph 12.2 General Conditions shall be subject to the approval of the Owner. The Owner shall require documentation regarding the condition of the surety company's capital and surplus. The General Contractor shall be required to secure his bonds from surety companies which meet the approval of the Owner. Sureties shall be required to acquire reinsurance for the portion of any bond risk that exceeds 10% of the surety

company's capital and surplus. Said companies shall be listed on current State of Texas lists of approved companies.

- .4 The surety, in guarantee of faithful performance of the Contract and the payment of labor and material expenses in connection herewith, shall agree to pay, in the event of forfeiture by the Contractor, all additional expenses of the Owner and the Architect with arise as a result of additional administrative and supervisory work, if any, to complete the work of the Contract, including travel, daily and man hour expenses.
- .5 Bonds shall be in the amount equal to one hundred percent (100%) of the contract sum for both the performance and payment of labor and materials, and shall be executed on forms which meet statutory requirements of the State of Texas.
- .6 Contractor shall record the performance and payment bond and the signed construction contract with the county clerk of the county in which the project is being performed prior to commencement of any Work.
- .7 All required bonds shall be issued only by the companies holding certificates of authority as acceptable sureties in the State of Texas and as acceptable reinsuring companies. Re-insurers must be duly authorized, accredited, or trusted to business in the State of Texas.

12.3 BUILDER'S RISK INSURANCE

- A. Contractor shall maintain, at his sole expense, all risk builders' risk insurance as follows:
 1. Contractor shall carry completed value form builder's risk property insurance upon the entire Work for 100% of the full replacement cost value thereof (100% includes additional costs of architectural and engineering services in the event of a loss). This policy shall include the interests of the Owner and the other Indemnities, Contractor, and Subcontractors in the work as

named insureds, as their interest may appear, and shall be on an "All Risk" basis for physical loss or damage including, without limitation, fire, flood, earthquake, subsidence, hail, theft, vandalism and malicious mischief and shall include coverage for portions of the Work while it is stored off the site or is in transit. This policy shall provide, by endorsement or otherwise, that Contractor shall be solely responsible for the payment of all premiums under the policy, and that Owner and the other Indemnities shall have no obligation for the payment thereof, notwithstanding that Owner and the other Indemnities are named insureds under the policy. Any insured loss or claim or loss shall be adjusted by the Owner, and any settlement payments shall be made payable to the Owner as trustee for the insureds, as their interest may appear, subject to the requirements of any applicable mortgages clause. Upon the occurrence of an insured loss or claim of loss, moneys 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 submitted to a court of competent jurisdiction to determine ownership of the dispute amounts 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.

12.4 CONTRACTOR'S EQUIPMENT POLICY

- A. Any such insurance policy covering Contractor's or its Subcontractor's equipment against loss by physical damage shall include an endorsement waiving the insurer's right of subrogation against the Indemnities. Such insurance shall be Contractor's and his Subcontractors sole and complete means

of recovery for any such loss. Should Contractor or his Subcontractors choose to self insure this risk, it is expressly agreed that the Contractor and its Subcontractors hereby waive any claim for damage or loss to said equipment in favor of the Indemnities.

12.5 EVIDENCE OF INSURANCE

- A. Evidence of the insurance coverage required to be maintained by the Contractor under this Article 12, represented by certificates of insurance issued by the insurance carrier, must be furnished to the Owner prior to Contractor starting Work. Certificates of insurance shall specify the insured status mentioned above in this Article 12, as well as the waivers or subrogation. Such certificates of insurance shall state that Owner will be notified in writing thirty (30) days prior to cancellation, material change, or non-renewal of insurance. Contractor shall provide to Owner a certified copy of any and all applicable insurance policies upon request of Owner. Timely renewal certificates will be provided to Owner as the coverage renews.

12.6 SUBCONTRACTOR'S INSURANCE

- A. Insurance similar to that required of Contractor shall be provided by or on behalf of all Subcontractors to cover their operations performed under the Contract Documents. Contractor shall be held responsible for any modification in these insurance requirements as they apply to Subcontractors. Contractor shall maintain certificates of insurance from all Subcontractors, enumerating, among other things, the waivers in favor of, and insured status of, the Indemnities, as required herein, and make them available to Owner upon request.

12.7 RELEASE AND WAIVER

- A. Contractor hereby releases, and shall cause its Subcontractors to release, Owner and the other Indemnities from any and all claims or causes of action whatsoever which Contractor and/or its Subcontractors might otherwise possess resulting in or from or in any way connected with any loss covered or which should have been covered by insurance, including the deductible portion thereof, maintained and/or required to be maintained by Contractor and/or its

Subcontractors pursuant to the Contract Documents.

12.8 INDEMNIFICATION

- A. To the fullest extent permitted by applicable law, Contractor shall and does agree to indemnify, protect, defend and hold harmless the Owner, Owner's partners, affiliated companies of Owner and of any partner, Architect and their respective officers, directors, shareholders, employees and agents (collectively the "Indemnities") from and against all claims, damages, losses, liens, causes of action, suits, judgments, and expenses, including attorney fees of any nature, kind or description of any person or entity, directly or indirectly arising out of, caused by, or resulting from (in whole or in part), (1) the Work performed hereunder, or any part thereof, (2) the Contract Documents, or (3) any act or omission of Contractor, any Subcontractor, anyone directly or indirectly employed by them, or anyone that they control or exercise control over, (collectively the "liabilities"). The obligations of Contractor under this indemnification shall apply to liabilities even if such liabilities are caused in whole or in part by the negligence of any Indemnities. Contractor shall promptly advise Owner in writing of any action, administrative or legal proceeding or investigation as to which this indemnification may apply, and Contractor, at Contractor's expense, shall assume on behalf of Owner (and the other Indemnities) and conduct with due diligence and in good faith the defense thereof with counsel satisfactory to the Owner; provided, however, that Owner shall have the right, at its option, to be represented therein by advisory counsel of its own selection and at its own expense. In the event of failure by the Contractor to fully perform in accordance with this indemnification paragraph, Owner, at its option, and without relieving Contractor of its obligations hereunder, may so perform, but all costs and expenses so incurred by Owner in that event shall be reimbursed by Contractor to Owner, together with interest on the same from the date any such expense was paid by Owner until reimbursed by Contractor, at the rate of interest provided to be paid on

judgments under the laws of the State of Texas. This indemnification shall not be limited to damages, compensation or benefit payable under insurance policies, worker's compensation acts, disability benefits acts or other employees' benefit acts.

- B. It is understood and agreed that subparagraph A of Paragraph 12.8 above is subject to, and expressly limited by, the terms and conditions of TEX. CIV. PRACT. & REM. CODE ANN. §§130.001-130.005 (Vernon supp. 1989), as amended. Contractor shall not be obligated under subparagraph 9.12 to indemnify or hold harmless Architect or an agent, servant, or employee of Architect from liability or damage that:

.1 is caused by or results from:

- a) defect in plans, designs, or specifications prepared, approved, or used by the Architect; or
- b) negligence of the Architect in the rendition or conduct of professional duties called for or arising out of the Contract Documents and the plans, designs or specifications that are a part of the contract Documents; and

.2 arises from:

- a) personal injury or death;
- b) property injury; or
- c) any other expense that arise from personal injury, death or property injury.

- C. It is agreed with respect to any legal limitations now or hereafter in effect and affecting the validity or enforceability of the indemnification obligation under this paragraph such legal limitations are made a part of the indemnification obligation and shall operate the amend to indemnification obligation to the minimum extent necessary to bring the provision into conformity with the requirements of such limitations, and as so modified, the indemnification obligation shall continue in full force and effect.

12.9 CLAIMS MADE POLICIES

- A. With respect to any of the insurance policies provided by Contractor pursuant to the contract Documents which are "claims made" policies, in the event at any

time any such policies are cancelled or not renewed, Contractor shall provide a substitute insurance policy(ies) with terms and conditions and in amounts which comply with the terms of the Contract Documents and with provides for retroactive coverage to the date of cancellation or non-renewal to fill any gaps in coverage which may exist due to the cancellation or non-renewal of the prior "claims made" policies. With respect to all "claims made" policies which are renewed, Contractor shall provide coverage retroactive to the date of commencement of the Work in said renewed policy. All said substitute or renewed "claim made" policies shall be maintained in full force and effect for the longer of (1) two (2) years from the date of completion of the work or (2) as otherwise required by the Contract Documents. A certificate evidencing continuation of such policies shall be submitted with the final application for payment as required by subparagraph 9.10.2. Nothing herein shall affect the continuing effect of the indemnity clauses in the Contract Documents.

12.10 HIGHLY PROTECTED RISK INSURANCE APPROVED

- A. It is understood the project may be approved as a "Highly Protected Risk" by Owner's property insurance carrier, and, if so approved, all work to be performed by Contractor must be done so as to maintain that approval.

13 UNCOVERING AND CORRECTION OF WORK

13.1 UNCOVERING OF WORK

- A. If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if required in writing by the Architect, be uncovered for the Architect's observation and be replaced at the Contractor's expense without change in the Contract Time.
- B. If a portion of the Work has been covered which the Architect has not specifically requested to observe prior to its being covered, the 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 charged to the Owner. If such Work is not in accordance with the Contract Documents, the Contractor shall pay such costs 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.

13.2 CORRECTION OF WORK

- A. The contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed or completed. The Contractor shall bear costs of correcting such rejected Work, including additional testing and inspection and compensation for the Architect's services and expenses made necessary thereby.
- B. 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 Subparagraph A of Paragraph 9.9, 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 unless the Owner has previously given the Contractor a written acceptance of such condition. This period of one year 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 performance of the Work. This obligation under this Subparagraph B of Paragraph 13.2 shall survive acceptance of the Work under the contract and termination of the Contract. The Owner shall give such notice promptly after discovery of the condition.
- C. The Contractor shall remove from the site portions of the Work which are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.
- D. If the Contractor fails to correct nonconforming Work within a reasonable time, the Owner may correct it in

accordance with Paragraph 2.4. If the Contractor does not proceed with correction of such nonconforming Work within a reasonable time fixed by written notice from the Architect, the Owner may remove it and store the salvable materials or equipment at the Contractor's expense. If the Contractor does not pay costs of such removal and storage within ten days after written notice, the Owner may upon ten additional days' written notice sell such materials and equipment at auction or at private sale and shall account for the proceeds thereof, after deducting costs and damages that should have been borne by the Contractor, including compensation for the Architect's services and expenses made necessary thereby. If such proceeds of sale do not cover costs which the Contractor should have borne, the Contract Sum shall be reduced by the deficiency. If payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the Owner.

- E. 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 which is not in accordance with the requirements of the Contract Documents.
- F. Nothing contained in this Paragraph 13.2 shall be construed to establish a period of limitation with respect to other obligations which the Contractor might have under the Contract Documents. Establishment of the time period of one year as described in Subparagraph B, Paragraph 13.2 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.

13.3 ACCEPTANCE OF NONCONFORMING WORK

- A. If the Owner prefers to accept Work which 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.

14 MISCELLANEOUS PROVISIONS

14.1 GOVERNING LAW

- A. The Contract shall be governed by the law of the place where the project is located. Federal Funding shall govern with regard to legal responsibilities and rights.

14.2 SUCCESSORS AND ASSIGNS

- A. The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to the other party hereto and to partners, successors, assigns and legal representatives of such other party in respect to covenants, agreements and obligations contained in the Contract Documents. 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 obligation under the contract.

14.3 WRITTEN NOTICE

- A. Written notice shall be deemed to have been duly served if delivered in person to the individual or 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 to the last business address known to the party giving notice.

14.4 RIGHTS AND REMEDIES

- A. 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.
- B. 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 thereunder except as may be specifically agreed in writing.

14.5 TEST AND INSPECTIONS

- A. Tests, inspections and approvals of portions of the Work required by the

Contract Documents or by law, ordinances, rules, regulations or orders of public authorities having jurisdiction shall be made at an appropriate time. Unless otherwise provided, the Contractor shall make arrangements for such test, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so the Architect may observe such procedures. The Owner shall bear costs of tests, inspections or approvals which do not become requirements until after bids are received or negotiations concluded.

- B. If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Subparagraph A of Paragraph 14.5, 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 Architect of when and where tests and inspections are to be made so the Architect may observe such procedures. the Owner shall bear such costs except as provided in Subparagraph C of Paragraph 14.5
- C. If such procedures for testing, inspection or approval under Subparagraphs A and B of Paragraph 14.5 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, the Contractor shall bear all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses.
- D. 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 Architect.
- E. 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.

- F. Test or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.
- G. The Contractor shall notify the Owner sufficiently in advance of back filling or concealing any facilities to permit proper inspection. If any facilities are concealed without approval or consent of the Owner, the Contractor shall uncover for inspection and recover such facilities at his own expense, when so requested by the Owner.
- H. Should it be considered necessary or advisable by the Owner at any time before final acceptance of the entire work to make an examination of work already completed by uncovering the same, the Contractor shall on request promptly furnish all necessary facilities, labor, and material. If such work is found to be defective in any important or essential respect, due to the fault of the Contractor or his subcontractors, the Contractor shall defray all expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the actual cost of labor and material necessarily involved in the examination and replacement, shall be allowed the Contractor and he shall, in addition, if completion of the work of the entire Contract has been delayed thereby, be granted a suitable extension of time on account of the additional work involved.
- I. Inspection of materials and appurtenances to be incorporated in the improvements included in this Contract may be made at the place of production, manufacture or shipment, whenever the quantity justifies it, and such inspection and acceptance, unless otherwise stated in the technical specifications, shall be final, except as regards (1) latent defects, (2) departures from specific requirements of the Contract, (3) damage or loss in transit, or (4) fraud or such gross mistakes as amount to fraud. Subject to the requirements contained in the preceding sentence, the inspection of materials as a

whole or in part will be made at the Project Site.

14.6 REVIEW BY OWNER

- A. The Owner and its authorized representatives and agents shall have access to and be permitted to observe and review all work, materials, equipment, payrolls, personnel records, employment conditions, material invoices, and other relevant data and records pertaining to this Contract, provided, however that all instructions and approval with respect to the work will be given to the Contractor only by the Owner through its authorized representatives or agents.

14.7 INTEREST

- A. Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

14.8 COMMENCEMENT OF STATUTORY LIMITATION PERIOD

- A. As between the Owner and Contractor:
 - .1 **Before Substantial Completion.** As to acts or failure to act occurring prior to the relevant date of Substantial Completion, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than such date of Substantial Completion;
 - .2 **Between Substantial Completion and Final Certificate for Payment.** As to acts or failures to act occurring subsequent to the relevant date of Substantial Completion and prior to issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of issuance of the final Certificate for Payment; and
 - .3 **After Final Certificate for Payment.** As to acts or failures to act occurring after the relevant date of issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any

alleged cause of action shall be deemed to have accrued in any and all events not later than the date of any act or failure to act by the Contractor pursuant to any warranty provided under Paragraph 3.5, the date of any correction of the Work or failure to correct the Work by the Contractor under Paragraph 13.2, or the date of actual commission of any other act or failure to perform any duty or obligation by the Contractor or Owner, whichever occurs last

14.9 WARRANTY OF TITLE

- A. No material, supplies, or equipment to be installed or furnished under this Contract shall be purchased subject to any chattel mortgage or under a conditional sale, lease-purchase, or other agreement by which an interest is retained by the seller or supplier. The Contractor shall warrant good title to all materials, supplies, and equipment installed or incorporated in the work and upon completion of all work, shall deliver the same together with all improvements and appurtenances constructed or placed by him to the Owner free from any claims, liens, or charges. Neither the Contractor nor any person, firm, or corporation furnishing any material or labor for any work covered by this Contract shall have any right to a lien upon any improvement or appurtenance. Nothing contained in this paragraph, however, shall defeat or impair the right of persons furnishing materials or labor to recover under any law permitting such persons to look for funds due the Contractor in the hands of the Owner. The provisions of this paragraph shall be inserted in all subcontracts and material contracts and notice of its provisions shall be given to all persons furnishing materials for the work when no formal contract is entered into for such materials.

14.10 COMPLIANCE WITH AIR AND WATER ACTS

- A. In compliance with the Clean Air Act, as amended, 41 U.S.C. Sec. 7401 et. seq., and the regulations of the Environmental Protection Agency with respect thereto, the Contractor agrees that:
1. Any facility to be utilized in the performance of this Contract or any subcontract shall not be a facility

listed on the EPA List of Violating Facilities pursuant to 40 CFR 15.20.

2. He will comply with all requirements of Section 114 of the Clean Air Act, as amended.

14.11 EQUAL EMPLOYMENT OPPORTUNITY

- A. The Contractor will not discriminate against any employee or the applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during their employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not limited to the following: employment, promotion, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Owner.
- B. The Contractor will, in all solicitations and advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.
- C. The Contractor will cause the foregoing provisions to be inserted in all subcontracts for any work covered by this contract so that such provisions will be binding upon each subcontractor, provided that the foregoing provisions shall not apply to contracts or subcontracts for standard commercial supplies or raw materials.
- D. The goals and timetables for minority and female participation are as follows:
1. Goals for Minority participation for each trade for the Brownsville, Harlingen, San Benito and Cameron Co. areas of Texas as currently defined by federal notification.
 2. Goals for female participation for each trade as currently defined by federal notification.
- These goals are applicable to all the Contractor's construction work (whether or not it is federal or federally assisted) performed in the covered area.

- E. The Contractor shall take affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions.
- F. Contractors are encouraged to participate in voluntary associations which assist in fulfilling their affirmative action obligations.
- G. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority.
- H. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.
- I. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts.
- J. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish other standards of compliance or upon the application of requirements for the hiring of local or other area residents.
- K. Minimum wages as defined by current Davis bacon wage rates for the geographical area in which the work is to be performed shall be in accordance with current 29 CFR 1.5 notification

14.12 AFFIRMATIVE ACTION FOR WORKERS WITH DISABILITIES

- A. The Contractor will not discriminate against any employee or applicant for employment because of physical or mental disability in regard to any position for which the employee or applicant for employment is qualified. The Contractor agrees to take affirmative action to employ, advance in employment and otherwise treat qualified disability individuals without discrimination based upon their physical or mental disability in all employment practices such as the following: employment, promotion, demotion or transfer, recruitment, advertising, layoff or termination, rates of

pay or other forms of compensation, and selection for training, including apprenticeship.

14.13 SECTION 109 OF THE HOUSING AND COMMUNITY DEVELOPMENT ACT OF 1974

- A. No person in the United States shall on the ground of race, color, national origin, or sex be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity funded in whole or in part with funds made available under this title.

14.14 THE PROVISION OF LOCAL TRAINING, EMPLOYMENT, AND BUSINESS OPPORTUNITIES

- A. To the greatest extent feasible opportunities for training and employment be given lower income residents of the project area and contracts for work in connection with the project be awarded to business concerns which are located in, or owned in substantial part by persons residing in the area of the project.
- B. The Contractor will include this clause in every subcontract for work in connection with the project.

14.15 NON SEGREGATED FACILITIES

- A. The Contractor certifies that he does not and will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not and will not permit his employees any segregated facilities at any of his establishments, or permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. As used in this paragraph the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise.

15 TERMINATION OR SUSPENSION OF THE CONTRACT

15.1 TERMINATION BY THE CONTRACTOR

- A. The Contractor may terminate the Contract if the Work is stopped for a period of 30 days through no act or fault

of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor, for any of the following reasons:

- .1 issuance of an order of a court or other public authority having jurisdiction;
 - .2 an act of government, such as a declaration of national emergency, making material unavailable;
 - .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 Subparagraph A, Paragraph 9.4 or because the Owner has not made payment on a Certificate of Payment within the time stated in the Contract Documents;
 - .4 if repeated suspensions, delays or interruptions by the Owner as described in Paragraph 15.3. 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; or
 - .5 the Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Subparagraph A, Paragraph 2.2.
- B.** If one of the above reasons exists, the Contractor may, upon seven additional days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed and for proven loss with respect to materials, equipment, tools, and construction equipment and machinery, including reasonable overhead, profit and damages.
- C.** If the work is stopped for a period of 60 days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has persistently failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the

Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Subparagraph B, Paragraph 15.1.

15.2 TERMINATION BY THE OWNER FOR CAUSE

- A.** The Owner may terminate the Contract if the Contractor:
- .1 persistently or repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
 - .2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractor;
 - .3 persistently disregards laws, ordinance, or rules, regulations or orders of a public authority having jurisdiction; or
 - .4 otherwise is guilty of substantial breach of a provision of the Contract documents.
- B.** When any of the above reasons exist, the Owner, upon certification by the Architect that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven day's written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:
- .1 take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
 - .2 accept assignment of subcontracts pursuant to Paragraph 5.4; and
 - .3 finish the work by whatever reasonable method the Owner may deem expedient.
- C.** When the Owner terminates the Contract for one of the reasons stated in Subparagraph A, Paragraph 15.2, the Contractor shall not be entitled to receive further payment until the Work is finished.
- D.** 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, such excess shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor shall pay

the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Architect, upon application, and this obligation for payment shall survive termination of the contract.

15.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

- A.** 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.
- B.** An Adjustment shall be made for increase in the cost of performance of the Contract, including profit on the increased

cost of performance, caused by suspension, delay or interruption. 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 this Contract.
- C.** Adjustments made in the Cost of performance may have a mutually agreed fixed or percentage fee.

END OF DOCUMENT

DOCUMENT 00 91 13 - FORM OF ADDENDA

ADDENDA

ADDENDUM NUMBER [_____]

DATE: [_____]

PROJECT: **Department of Public Works Automotive Warehouse Expansion & Elevator**

PROJECT NUMBER: **1809**

OWNER: **City of McAllen**

ARCHITECT: **Negrete & Kolar Architects, LLP**

TO: **Prospective Bidders**

This Addendum forms a part of the Contract Documents and modifies the Bidding Documents dated _____, Addendum Number _____ issued _____, and Addendum Number _____ issued _____, with amendments and additions noted below.

Acknowledge receipt of this Addendum in the space provided in the Bid Form. Failure to do so may disqualify the Bidder.

This Addendum consists of _____ pages and the following Drawings:

No.	Drawing Title	Issue Date

CHANGES TO ADDENDUM NUMBER ____ Issued _____

CHANGES TO THE PROJECT MANUAL

CHANGES TO THE DRAWINGS

APPROVAL OF ADDITIONAL PRODUCTS/SYSTEMS

END OF DOCUMENT

PART THREE

TECHNICAL SPECIFICATIONS

DIVISION 1

GENERAL REQUIREMENTS

THE AGREEMENT, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, SUPPLEMENTARY CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, AND ALL ADDENDA ARE A PART OF THE CONTRACT. THE CONTRACTOR SHALL CONSULT THEM IN DETAIL FOR INSTRUCTIONS PERTAINING TO THE WORK. THE CONTRACTOR SHALL ALSO CONSULT ALL OTHER DIVISIONS AND SECTIONS OF THE PROJECT MANUAL, AND ALL DRAWINGS IN THE EXECUTION OF THE WORK OF THE CONTRACT.

THE CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, SYSTEMS, EQUIPMENT, ITEMS, ARTICLES, OPERATIONS, AND/OR METHODS LISTED, IMPLIED, MENTIONED, OR SCHEDULED IN THE CONTRACT DOCUMENTS AND/OR NECESSARY AND/OR REQUIRED FOR THE SATISFACTORY COMPLETION OF THE WORK.

THE LISTING OF WORK, REQUIREMENTS, AND PRODUCTS IN THIS SECTION IS NOT INTENDED TO BE CONCLUSIVE. THE CONTRACTOR SHALL CHECK ALL OTHER PARTS OF THE CONTRACT DOCUMENTS AND SHALL PROVIDE ALL MISCELLANEOUS ITEMS OF WORK AND PRODUCTS NECESSARY FOR THE SATISFACTORY COMPLETION OF THE WORK DESCRIBED IN THE CONTRACT DOCUMENTS.

SECTION 01 10 00

SUMMARY

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Project Description.
- B. Contract description.
- C. Work by Owner.
- D. Contractor's use of site and premises.
- E. Work sequence.
- F. Specification Conventions.

1.2 PROJECT DESCRIPTION

- A. Work of the Project includes expansion of an existing metal warehouse building with canopies and new elevator.
- B. The Work consists primarily of but is not necessarily limited to the following description as described and designated in the Contract Documents:
 - 1. Construction of the project in its entirety as described and indicated in the Contract Documents.

1.3 CONTRACT DESCRIPTION

- A. Provide all labor, materials, systems, equipment, items, articles, operations, and/or methods listed, implied, mentioned, or scheduled in the Contract Documents and/or necessary and/or required for the satisfactory completion of the work.
- B. The listing in any individual part of the Contract Documents of the work, requirements, products, materials, equipment, methods, or other item or process required for the Work is not intended to be conclusive. The Contractor shall coordinate all portions of the Contract Documents and shall in totality provide all miscellaneous items of work and products necessary for the satisfactory completion of the Work described in the Contract Documents.

1.4 WORK BY OWNER

- A. Items noted NIC (Not in Contract) will be furnished and installed by Owner or others.

1.5 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Access to Site: Contractor will have full use of site for purposes of the work related to the project.
- B. Contractor is expected to secure site occupied by his operations for safety, and security purposes with temporary fencing suitable for the purposes described.

1.6 WORK SEQUENCE

- A. Sequence the Work to maintain dry building conditions with special attention regarding wall and ceiling cavities, as well as in a manner that eliminates retro fitting or re-working of the Work.
- B. Do not engage in practices that will cover or conceal damp or wet conditions.
- C. Assure dry and clean mechanical duct systems. Do not run any mechanical air handling equipment without filters and without necessary filter changes when engaged during the construction dry-in and finish-out phase.
- D. Limit final pavement of On-site improvements until all the work of the project is ready for substantial completion. Condition of all concrete and asphalt pavement shall be in a "like new" condition when accepted by the Owner

1.7 SPECIFICATION CONVENTIONS

- A. These specifications are written in imperative mood and streamlined form. This imperative language is directed to the Contractor, unless specifically noted otherwise. The words "shall be" are included by inference where a colon (:) is used within sentences or phrases.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 20 00
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Contingency allowances.
- B. Structural materials allowances.
- C. Schedule of values.
- D. Applications for payment.
- E. Change procedures.
- F. Defect assessment.
- G. Unit prices.
- H. Alternates.

1.2 CONTINGENCY ALLOWANCES

- A. Include in the Contract, a stipulated sum/price of \$5,000 for use upon Owner's instruction.
- B. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.
- C. Funds will be drawn from Contingency Allowance only by Change Order.
- D. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

1.3 STRUCTURAL MATERIAL ALLOWANCES

- A. Include in the Contract, the cost of providing all materials and labor and attributable overhead and profit, for the installation as directed by the Architect and/or Structural Engineer. Refer to Structural Drawings General Notes.
 - 1. Structural Steel: 4 tons; \$16,000.00.
 - a. Unused balance credited back to Owner at \$4,000/ton.

1.4 SCHEDULE OF VALUES

- A. Submit printed schedule on AIA Form G703 - Continuation Sheet for G702.
- B. Submit Schedule of Values in duplicate within 15 days after date established in Notice to Proceed.
- C. Format: Utilize Table of Contents of this Project Manual. Identify each line item with number and title of major specification Section. Identify material and labor as separate line items. Include site mobilization, bonds and insurance.
- D. Include in each line item, amount of Allowances specified in this section as a separate line item.
- E. Include separately from each line item, direct proportional amount of Contractor's overhead and profit to coincide with the progress of the Work as a separate line item.

- F. Revise schedule to list approved Change Orders, with each Application For Payment.

1.5 APPLICATIONS FOR PAYMENT

- A. Submit three copies of each application on AIA Form G702 - Application and Certificate for Payment and AIA G703 - Continuation Sheet for G702.
- B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment. Provide dollar value in each column for each line item for portion of work performed and for stored products.
- C. Submit updated construction schedule with each Application for Payment.
- D. Payment Period: Submit at intervals stipulated in the Agreement.
- E. Submit with transmittal letter as specified for Submittals in Section 01 33 00 - Submittal Procedures.
- F. Substantiating Data: When Architect/Engineer requires substantiating information, submit data justifying dollar amounts in question. Include the following with Application for Payment:
 - 1. Partial release of liens from major subcontractors and vendors.
 - 2. Affidavits attesting to off-site stored products.
 - 3. Construction progress schedules, revised and current as specified.

1.6 CHANGE PROCEDURES

- A. Submittals: Submit name of individual authorized to receive change documents and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.
- B. The Architect/Engineer will advise of minor changes in the Work not involving adjustment to Contract Sum/Price or Contract Time by issuing supplemental instructions on Architect developed form.
- C. The Architect/Engineer may issue a Proposal Request or Notice of Change including a detailed description of proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change and the period of time during which the requested price will be considered valid. Contractor will prepare and submit estimate within 10 calendar days.
- D. Contractor may propose changes by submitting a request for change to Architect/Engineer, describing proposed change and its full effect on the Work. Include a statement describing reason for the change, and effect on Contract Sum/Price and

Contract Time with full documentation and a statement describing effect on Work by separate or other Contractors. Document requested substitutions in accordance with Section 01 60 00 - Product Requirements.

- E. Stipulated Sum/Price Change Order: Based on Proposal Request and Contractor's fixed price quotation or Contractor's request for Change Order as approved by Architect/Engineer.
- F. Unit Price Change Order: For contract unit prices and quantities, the Change Order will be executed on fixed unit price basis. For unit costs or quantities of units of work which are not pre-determined, execute Work under Construction Change Directive. Changes in Contract Sum/Price or Contract Time will be computed as specified for Time and Material or Force Account Change Order.
- G. Construction Change Directive: Architect may issue directive signed by Owner, instructing Contractor to proceed with change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute change.
- H. Time and Material or Force Account Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in Conditions of the Contract. Architect/Engineer will determine change allowable in Contract Sum/Price and Contract Time as provided in Contract Documents. Provide full information required for evaluation of proposed changes to substantiate costs for changes in the Work.
- I. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.
- J. Document each quotation for change in cost or time with sufficient data to allow evaluation of quotation.
- K. Change Order Forms: AIA G701.
- L. Execution of Change Orders: Architect/Engineer will issue Change Orders for signatures of parties as provided in Conditions of the Contract.
- M. Correlation Of Contractor Submittals:
 - 1. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as separate line item and adjust Contract Sum/Price.
 - 2. Promptly revise progress schedules to reflect change in Contract Time, revise sub-schedules to adjust times for other items of

work affected by the change, and resubmit.

- 3. Promptly enter changes in Project Record Documents.

1.7 DEFECT ASSESSMENT

- A. Replace the Work, or portions of the Work, not conforming to specified requirements.
- B. If, in the opinion of the Architect/Engineer, it is not practical to remove and replace the Work, the Architect/Engineer will direct appropriate remedy or adjust payment.
- C. The defective Work may remain, but unit sum/price will be adjusted to new sum/price at discretion of Architect/Engineer and Owner.
- D. Defective Work not accepted will not be funded. Work found to be defective after partial progress funding may be reduced to its appropriate level of value or to zero based on the evaluation of the Architect
- E. Individual specification sections may modify these options or may identify specific formula or percentage sum/price reduction.
- F. Authority of Architect and Owner to assess defects and identify payment adjustments, is final.
- G. Non-Payment For Rejected Products: Payment will not be made for rejected products for any of the following:
 - 1. Products wasted or disposed of in a manner that is not acceptable.
 - 2. Products determined as unacceptable before or after placement.
 - 3. Products not completely unloaded from transporting vehicle.
 - 4. Products placed beyond lines and levels of required Work.
 - 5. Products remaining on hand after completion of the Work.
 - 6. Loading, hauling, and disposing of rejected products.

1.8 ALTERNATES

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in Owner-Contractor Agreement.
- B. Coordinate related work and modify surrounding work.
- C. Schedule of Alternates:
 - 1. Alternate No. 1 – New Elevator:
 - a. Base Bid Item: No elevator and associated items, including structural enclosures, provided. Existing pit and conditions remain.
 - b. Alternate Bid Item: New elevator with associated items, including structural enclosures. Refer to Section 14 21 23 Electric Traction Passenger Elevator and

- the Construction Drawings for additional information.
2. Alternate No. 2 - New LED Lighting at Existing Warehouse Ceiling:
 - a. Base Bid Item: Lighting at existing warehouse ceiling to remain.
 - b. Alternate Bid Item: Remove lighting at existing warehouse and replace with new LED Light Fixtures and associated items. Refer MEP Specifications and Drawings for additional information.
 3. Alternate No. 3 - Refinish Existing North & South Canopies:

- a. Base Bid Item: Existing canopies remain in their current condition.
- b. Alternate Bid Item: Power-wash, prime, and re-paint existing north & south canopies, including structure. Minor repair as indicated and/or necessary. Refer Drawings for additional information.

PART 2 PRODUCTS - NOT USED**PART 3 EXECUTION - NOT USED****END OF SECTION**

SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Coordination and project conditions.
- B. Field engineering.
- C. Preconstruction meeting.
- D. Site mobilization meeting.
- E. Progress meetings.
- F. Pre-installation meetings.
- G. Cutting and patching.
- H. Special procedures.

1.2 COORDINATION AND PROJECT CONDITIONS

- A. Coordinate scheduling, submittals, and Work of various sections of Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, operating equipment.
- C. Coordinate space requirements, supports, and installation of mechanical and electrical Work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within construction. Coordinate locations of fixtures and outlets with finish elements.
- E. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion and for portions of Work designated for Owner's occupancy.
- F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.3 FIELD ENGINEERING

- A. Employ Land Surveyor registered in the State of Texas and acceptable to Architect.
- B. Locate and protect survey control and reference points. Promptly notify Architect of discrepancies discovered.
- C. Control datum for survey is that established by Owner provided survey.

- D. Verify set-backs and easements; confirm drawing dimensions and elevations.
- E. Provide field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.
- F. Submit copy of site drawing and certificate signed by Land Surveyor certifying elevations and locations of the Work are in conformance with Contract Documents. Such document shall be considered as the Survey for Owner's Property finance and record needs.
- G. Maintain complete and accurate log of control and survey work as Work progresses.
- H. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- I. Promptly report to Architect loss or destruction of reference point or relocation required because of changes in grades or other reasons.
- J. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.

1.4 PRECONSTRUCTION MEETING

- A. Architect will schedule meeting after Notice to Proceed has been issued to the Contractor.
- B. Attendance Required: Owner, Architect, Contractor, and major subcontractors.
- C. The Agenda may include but is not limited to:
 - 1. Execution of Owner-Contractor Agreement.
 - 2. Submission of executed bonds and insurance certificates.
 - 3. Distribution of Contract Documents.
 - 4. Submission of List of Subcontractors, List of Products, Schedule of Values, and Progress Schedule.
 - 5. Designation of personnel representing parties in Contract.
 - 6. Procedures and processing of field decisions, submittals, substitutions, Applications for Payments, Proposal Request, Change Orders, and Contract Closeout Procedures.
 - 7. Scheduling.
 - 8. Scheduling activities of Geotechnical Engineer.
 - 9. Use of premises by Owner and Contractor.
 - 10. Security and housekeeping procedures.
 - 11. Application for Payment procedures.
 - 12. Progress meeting frequency.
- D. Record minutes and distribute copies within ten days after meeting to participants, with one copy to Architect, Owner, and those affected by decisions made.

1.5 SITE MOBILIZATION MEETING

- A. Owner will schedule meeting at Project site prior to Contractor occupancy.
- B. Attendance Required: Owner, Architect, Special Consultants, and Contractor, Contractor's Superintendent, and major Subcontractors.
- C. Agenda:
 - 1. Use of premises by Owner and Contractor.
 - 2. Owner's requirements.
 - 3. Construction facilities and controls provided by Owner.
 - 4. Temporary utilities provided by Owner.
 - 5. Survey and building layout.
 - 6. Security and housekeeping procedures.
 - 7. Schedules.
 - 8. Application for Payment procedures.
 - 9. Procedures for testing.
 - 10. Procedures for maintaining record documents.
 - 11. Requirements for start-up of equipment.
 - 12. Inspection and acceptance of equipment put into service during construction period.
- D. Record minutes and distribute copies within ten days after meeting to participants, with one copy to Architect, Owner, and those affected by decisions made.

1.6 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at maximum monthly intervals.
- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required: Job superintendent, major subcontractors and suppliers, Owner, Architect, as appropriate to agenda topics for each meeting.
- D. The Agenda may include but is not limited to:
 - 1. Review minutes of previous meetings.
 - 2. Review of Work progress.
 - 3. Field observations, problems, and decisions.
 - 4. Identification of problems impeding planned progress.
 - 5. Review of submittals schedule and status of submittals.
 - 6. Review of off-site fabrication and delivery schedules.
 - 7. Maintenance of progress schedule.
 - 8. Corrective measures to regain projected schedules.
 - 9. Planned progress during succeeding work period.
 - 10. Coordination of projected progress.
 - 11. Maintenance of quality and work standards.
 - 12. Effect of proposed changes on progress schedule and coordination.
 - 13. Review of Application of Payment.

14. Other business relating to Work.

- E. Record minutes and distribute copies within ten days after meeting to participants, with one copy to Architect, Owner, and those affected by decisions made.

1.7 PRE-INSTALLATION MEETINGS

- A. When required in individual specification sections, convene pre-installation meetings at Project site prior to commencing work of specific section.
- B. Require attendance of parties directly affecting, or affected by, Work of specific section.
- C. Notify Architect ten days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 - 1. Review conditions of installation, preparation and installation procedures.
 - 2. Review coordination with related work.
- E. Record minutes and distribute copies within ten days after meeting to participants, with one copy to Architect, Owner, and those affected by decisions made.

PART 2 PRODUCTS - NOT USED**PART 3 EXECUTION****3.1 CUTTING AND PATCHING**

- A. Employ skilled and experienced installer to perform cutting and patching.
- B. Submit written request in advance of cutting or altering elements affecting:
 - 1. Structural integrity of element.
 - 2. Integrity of weather-exposed or moisture-resistant elements.
 - 3. Efficiency, maintenance, or safety of element.
 - 4. Visual qualities of sight exposed elements.
 - 5. Work of Owner or separate contractor.
- C. Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to:
 - 1. Fit the several parts together, to integrate with other Work.
 - 2. Uncover Work to install or correct ill-timed Work.
 - 3. Remove and replace defective and non-conforming Work.
 - 4. Remove samples of installed Work for testing.
 - 5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.
- D. Execute work by methods to avoid damage to other Work, and to provide proper surfaces to receive patching and finishing.
- E. Cut masonry and concrete materials using masonry saw or core drill.

- F. Restore Work with new products in accordance with requirements of Contract Documents.
- G. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- H. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
- I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material to full thickness of penetrated element.
- J. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for assembly, refinish entire unit.
- K. Identify hazardous substances or conditions exposed during the Work to Architect/Engineer for decision or remedy.

3.2 SPECIAL PROCEDURES

- A. Materials: As specified in product sections; match existing with new products and salvaged products for patching and extending work.
- B. Employ skilled and experienced installer to perform alteration work.
- C. Cut, move, or remove items as necessary for access to alterations and renovation Work. Replace and restore at completion.
- D. Remove unsuitable material not marked for salvage, including rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.
- E. Remove debris and abandoned items from area and from concealed spaces.

- F. Prepare surface and remove surface finishes to permit installation of new work and finishes.
- G. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.
- H. Remove, cut, and patch Work in manner to minimize damage and to permit restoring products and finishes to original or specified condition.
- I. Refinish existing visible surfaces to remain in renovated rooms and spaces, to specified condition for each material, with neat transition to adjacent finishes.
- J. Where new Work abuts or aligns with existing, provide smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.
- K. When finished surfaces are cut so that smooth transition with new Work is not possible, terminate existing surface along straight line at natural line of division and submit recommendation to Architect/Engineer for review.
- L. Where change of plane of 1/4- inch or more occurs, submit recommendation for providing smooth transition to Architect/Engineer for review.
- M. Trim existing doors to clear new floor finish. Refinish trim to original or specified condition.
- N. Patch or replace portions of existing surfaces which are damaged, lifted, discolored, or showing other imperfections.
- O. Finish surfaces as specified in individual product sections.

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Submittal procedures.
- B. Construction progress schedules.
- C. Proposed products list.
- D. Product data.
- E. Shop drawings.
- F. Samples.
- G. Design data.
- H. Test reports.
- I. Certificates.
- J. Manufacturer's instructions.
- K. Manufacturer's field reports.
- L. Erection drawings.

1.2 SUBMITTAL PROCEDURES

- A. Develop a list of submittals and submittal schedule to inform the A/E team of when submittals are anticipated to be scheduled.
- B. Transmit each submittal with Architect/Engineer accepted form.
- C. Complete the submittal form in accordance with the Architect's Instructions. Sequentially number transmittal forms. Mark revised submittals with original number and sequential alphabetic suffix.
- D. Identify Project, Contractor, subcontractor and supplier; pertinent drawing and detail number, and specification section number, appropriate to submittal.
- E. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with requirements of the Work and Contract Documents.
- F. Schedule submittals to expedite Project and deliver to Architect at business address. Coordinate submission of related items.
- G. For each submittal for review, allow 15 working days for the Architect to process submittal excluding delivery time to and from Contractor.
- H. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of completed Work.
- I. Allow space on submittals for Contractor and Architect/Engineer review stamps.
- J. When revised for resubmission, identify changes made since previous submission.

- K. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.
- L. Submittals not requested will not be recognized or processed.

1.3 CONSTRUCTION PROGRESS SCHEDULES

- A. Submit initial schedules within 15 working days after date established in Notice to Proceed. After review, resubmit required revised data within ten working days.
- B. Submit revised Progress Schedules with each Application for Payment, identifying changes since previous version.
- C. Distribute copies of reviewed schedules to Project site file, subcontractors, suppliers, and other concerned parties.
- D. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.
- E. Submit as a minimum, computer generated horizontal bar chart with separate line for each major portion of Work or operation or with separate line for each section of Work, identifying first workday of each week. At the Contractors option, Contractor may submit a computer-generated network analysis diagram using the critical path or PERT method, as outlined in AGC's "The Use of CPM in Construction."
- F. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate early and late start, early and late finish, float dates, and duration.
- G. Indicate estimated percentage of completion for each item of Work at each submission.
- H. Submit separate schedule of submittal dates for shop drawings, product data, and samples, including Owner furnished products and products identified under Allowances, and dates reviewed submittals will be required from Architect/Engineer. Indicate decision dates for selection of finishes.
- I. Indicate delivery dates for Owner furnished products and products identified under Allowances.
- J. Revisions to Schedules:
 - 1. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
 - 2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.
 - 3. Prepare narrative report to define problem areas, anticipated delays, and impact on

Schedule. Report corrective action taken, or proposed, and its effect including effect of changes on schedules of separate contractors.

1.4 PROPOSED PRODUCTS LIST

- A. Within 15 days after date of Notice to Proceed, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
- B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.5 PRODUCT DATA

- A. Product Data: Submit to Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
- B. Submit number of copies Contractor requires, plus one copy for the Architect and one copy for each Engineer/consultant required to review which the Architect / Engineer / Consultant will retain. If submitted in electronic format acceptable to Architect / Engineer / Consultant, multiple copies are not required.
- C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- D. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- E. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.

1.6 SHOP DRAWINGS

- A. Shop Drawings: Submit to Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
- B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. When required by individual specification sections, provide shop drawings signed and sealed by professional engineer responsible for designing components shown on shop drawings.
 - 1. Include signed and sealed calculations to support design.

- 2. Submit drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.
- 3. Make revisions and provide additional information when required by authorities having jurisdiction.
- D. Submit number of opaque reproductions Contractor requires, plus one copy for the Architect and one copy for each Engineer / Consultant required to review which the Architect/Engineer/Consultant will retain. If submitted in electronic format acceptable to Architect/Engineer/Consultant, multiple copies are not required.
- E. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.

1.7 SAMPLES

- A. Samples: Submit to Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
- B. Samples for Selection as Specified in Product Sections:
 - 1. Submit to Architect/Engineer for aesthetic, color, or finish selection.
 - 2. Submit samples of finishes from full range of manufacturers' standard colors, textures, and patterns for Architect/Engineer selection. Submit samples from custom colors, textures and patterns where required by Specifications.
- C. Submit samples to illustrate functional and aesthetic characteristics of Products, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
- D. Include identification on each sample, with full Project information.
- E. Submit number of samples specified in individual specification sections; Architect/Engineer will retain one sample.
- F. Reviewed samples which may be used in the Work are indicated in individual specification sections.
- G. Samples will not be used for testing purposes unless specifically stated in specification section.
- H. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents purposes described in Section 01 70 00 - Execution and Closeout Requirements.

1.8 DESIGN DATA

- A. Submit for Architect/Engineer's knowledge as contract administrator or for Owner.
- B. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.9 TEST REPORTS

- A. Submit for Architect/Engineer's knowledge as contract administrator or for Owner.
- B. Submit test reports for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.10 CERTIFICATES

- A. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or Contractor to Architect/Engineer, in quantities specified for Product Data.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or Product but must be acceptable to Architect/Engineer.

1.11 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Architect/Engineer

for delivery to Owner in quantities specified for Product Data.

- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.12 MANUFACTURER'S FIELD REPORTS

- A. When specified in individual specification sections, submit reports for Architect/Engineer's benefit as contract administrator or for Owner.
- B. Submit report in duplicate within 10 days of observation to Architect/Engineer for information.
- C. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.13 ERECTION DRAWINGS

- A. When specified in individual specification sections, submit drawings for Architect/Engineer's benefit as contract administrator or for Owner.
- B. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.
- C. Data indicating inappropriate or unacceptable Work may be subject to action by Architect/Engineer or Owner.

PART 2 PRODUCTS - NOT USED**PART 3 EXECUTION - NOT USED**

END OF SECTION

SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Quality control and control of installation.
- B. Tolerances.
- C. References.
- D. Labeling.
- E. Mock-up requirements.
- F. Testing and inspection services.
- G. Manufacturers' field services.
- H. Examination.
- I. Preparation.

1.2 QUALITY CONTROL AND CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step, in sequence.
- C. When manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons qualified to produce required and specified quality.
- F. Verify field measurements are as indicated on Shop Drawings or as instructed by manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.3 TOLERANCES

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

1.4 REFERENCES

- A. For products or workmanship specified by association, trade or other consensus standards, comply with requirements of standard, except when more rigid requirements

are specified or are required by applicable codes.

- B. Conform to reference standard by date of issue current on date of Contract Documents except where specific date is established by code.
- C. Obtain copies of standards where required by product specification sections.
- D. When specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
- E. Neither contractual relationships, duties, nor responsibilities of parties in Contract nor those of Architect shall be altered from Contract Documents by mention or inference otherwise in reference documents.

1.5 LABELING

- A. Attach label from agency approved by authority having jurisdiction for products, assemblies, and systems required to be labeled by applicable code.
- B. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label.
 - 1. Model number.
 - 2. Serial number.
 - 3. Performance characteristics.

1.6 MOCK-UP REQUIREMENTS

- A. Tests will be performed under provisions identified in this section and identified in respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Accepted mock-ups shall be comparison standard for remaining Work.
- D. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed; remove mock-up and clear area when directed to do so by Architect.

1.7 TESTING AND INSPECTION SERVICES

- A. Owner will employ and pay for specified services of an independent firm to perform testing and inspection.
- B. The independent firm will perform tests, inspections and other services specified in individual specification sections and as required by authority having jurisdiction.
 - 1. Laboratory: Authorized to operate at Project location.

2. Laboratory Staff: Maintain full time registered Engineer on staff to review services.
3. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to National Bureau of Standards or accepted values of natural physical constants.
- C. Testing, inspections and source quality control may occur on or off project site. Perform off-site testing as required by Architect or Owner.
- D. Reports will be submitted by independent firm to Architect, Contractor, and authority having jurisdiction, in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
 1. Submit final report indicating correction of Work previously reported as non-compliant.
- E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
 1. Notify Architect and independent firm 24 hours prior to expected time for operations requiring services.
 2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.
- F. Testing and employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- G. Re-testing or re-inspection required because of non-conformance to specified requirements shall be performed by same independent firm on instructions by Architect. Payment for re-testing or re-inspection will be charged to Contractor by deducting testing charges from Contract Sum.
- H. Agency Responsibilities:
 1. Test samples of mixes submitted by Contractor.
 2. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
 3. Perform specified sampling and testing of products in accordance with specified standards.
 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 5. Promptly notify Architect and Contractor of observed irregularities or non-conformance of Work or products.
 6. Perform additional tests required by Architect.
 7. Attend preconstruction meetings and progress meetings.
- I. Agency Reports: After each test, promptly submit two copies of report to Architect, Contractor, and authority having jurisdiction. When requested by Architect, provide interpretation of test results. Include the following:
 1. Date issued.
 2. Project title and number.
 3. Name of inspector.
 4. Date and time of sampling or inspection.
 5. Identification of product and specifications section.
 6. Location in Project.
 7. Type of inspection or test.
 8. Date of test.
 9. Results of tests.
 10. Conformance with Contract Documents.
- J. Limits On Testing Authority:
 1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 2. Agency or laboratory may not approve or accept any portion of the Work.
 3. Agency or laboratory may not assume duties of Contractor.
 4. Agency or laboratory has no authority to stop the Work.

1.8 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, and test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Architect 30 days in advance of required observations. Observer subject to approval of Architect.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- D. Refer to Section 01 33 00 - Submittal Procedures, MANUFACTURERS' FIELD REPORTS article.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify existing substrate is capable of structural support or attachment of new Work being applied or attached.

- C. Examine and verify specific conditions described in individual specification sections.
- D. Verify utility services are available, of correct characteristics, and in correct locations.

3.2 PREPARATION

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

3.3 SCHEDULE OF REFERENCES

- A. The following schedule of references and standards are for the Contractors information only. The schedule is not meant to be conclusive and the Contractor shall consult all individual parts of the Contract Documents for references to applicable standards:

AA	Aluminum Association 818 Connecticut Avenue, N.W. Washington, DC 20006
AABC	Associated Air Balance Council 1000 Vermont Avenue, N.W. Washington, DC 20005
ACI	American Concrete Institute Box 19150, Redford Station Detroit, MI 48219
ADC	Air Diffusion Council 230 North Michigan Avenue Chicago, IL 60601
AGC	Associated General Contractors of America 1957 E. Street, N.W. Washington, DC 20006
AI	Asphalt Institute Asphalt Institute Building College Park, MD 20740
AIA	American Institute of Architects 1735 New York Avenue, N.W. Washington, DC 20006
AISC	American Institute of Steel Construction 400 North Michigan Avenue, 8th Floor Chicago, IL 60611
AISI	American Iron and Steel Institute 1000 16th Street, N.W. Washington, DC 20036
AITC	American Institute of Timber Construction 333 W. Hampden Avenue Englewood, CO 80110
AMCA	Air Movement and Control Association 30 West University Drive Arlington Heights, IL 60004
ANSI	American National Standards Institute 1430 Broadway

	New York, NY 10018
APA	American Plywood Association Box 11700 Tacoma, WA 98411
ARI	Air-Conditioning and Refrigeration Institute 1501 Wilson Boulevard Arlington, VA 22209
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers 1791 Tullie Circle, N.E. Atlanta, GA 30329
ASME	American Society of Mechanical Engineers 345 East 47th Street New York, NY 10017
ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, PA 19103
AWI	Architectural Woodwork Institute 2310 South Walter Reed Drive Arlington, VA 22206
AWPA	American Wood Preservers' Association 7735 Old Georgetown Road Bethesda, MD 20014
AWS	American Welding Society 550 LeJeune Road, N.W. Miami, FL 33135
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235
BIA	Brick Institute of America 11490 Commerce Park Drive Reston, VA 22091
CDA	Copper Development Association 57th Floor, Chrysler Building 405 Lexington Avenue New York, NY 10174
CLFMI	Chain Link Fence Manufacturers Institute 1101 Connecticut Avenue, N.W. Washington, D.C. 20036
CRSI	Concrete Reinforcing Steel Institute 933 Plum Grove Road Schaumburg, IL 60195
DHI	Doors and Hardware Institute 7711 Old Springhouse Road McLean, VA 22102
EJCDC	Engineers Joint Contract Documents Committee American Consulting Engineers Council 1015 15th Street, N.W. Washington, DC 20005
EJMA	Expansion Joint Manufacturers Association 25 North Broadway

	Tarrytown, NY 10591		
FGMA	Flat Glass Marketing Association 3310 Harrison White Lakes Professional Building Topeka, KS 66611	NFPA	National Forest Products Association 1619 Massachusetts Avenue, N.W. Washington, D.C. 20036
FM	Factory Mutual System 1151 Boston-Providence Turnpike P.O. Box 688 Norwood, MA 02062	NRCA	National Roofing Contractors Association 8600 Bryn Mawr Avenue Chicago, IL 60631
FS	Federal Specifications General Services Administration Specifications and Consumer Information Distribution Section (WFSIS) Washington Navy Yard, Bldg. 197 Washington, D.C. 20407	NSWMA	National Solid Wastes Management Association 1730 Rhode Island Avenue, N.W. Washington, D.C. 20036
GA	Gypsum Association 1603 Orrington Avenue Evanston, IL 60201	NWMA	National Woodwork Manufacturers Association 205 W. Towhy Avenue Park Ridge, IL 60068
ICBO	International Conference of Building Officials 5360 S. Workman Mill Road Whittier, CA 90601	PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077
IEEE	Institute of Electrical and Electronics Engineers 345 East 47th Street New York, NY 10017	PS	Product Standard U.S. Department of Commerce Washington, DC 20203
IMIAC	International Masonry Industry All-Weather Council International Masonry Institute 815 15th Street, N.W. Washington, D.C. 20005	SDI	Steel Deck Institute P.O. Box 9506 Canton, OH 44711
MBMA	Metal Building Manufacturer's Association 1230 Keith Building Cleveland, OH 44115	SDI	Steel Door Institute 712 Lakewood Center North 14600 Detroit Avenue Cleveland, OH 44107
ML/SFA	Metal Lath/Steel Framing Association 221 North LaSalle Street Chicago, IL 60601	SIGMA	Sealed Insulating Glass Manufacturers Association 111 East Wacker Drive Chicago, IL 60601
NAAMM	National Association of Architectural Metal Manufacturers 221 North LaSalle Street Chicago, IL 60601	SJI	Steel Joist Institute 1205 48th Avenue North Suite A Myrtle Beach, SC 29577
NCMA	National Concrete Masonry Association P.O. Box 781 Herndon, VA 22070	SMACNA	Sheet Metal and Air Conditioning Contractor's National Association 8224 Old Court House Road Vienna, VA 22180
NEBB	National Environmental Balancing Bureau 8224 Old Courthouse Road Vienna, VA 22180	SSPC	Steel Structures Painting Council 4400 Fifth Avenue Pittsburgh, PA 15213
NEMA	National Electrical Manufacturer's Association 2101 'L' Street, N.W. Washington, DC 20037	TCA	Tile Council of America, Inc. Box 326 Princeton, NJ 08540
NFPA	National Fire Protection Association Battery March Park Quincy, MA 02269	UL	Underwriters' Laboratories, Inc. 333 Pfingston Road Northbrook, IL 60062
		WCLIB	West Coast Lumber Inspection Bureau 6980 S.W. Varns Road Box 23145 Portland, OR 97223
		WWPA	Western Wood Products Association 1500 Yeon Building Portland, OR 97204

END OF SECTION

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Temporary Utilities:
 - 1. Temporary electricity.
 - 2. Temporary lighting for construction purposes.
 - 3. Temporary heating.
 - 4. Temporary cooling.
 - 5. Temporary ventilation.
 - 6. Temporary communication service.
 - 7. Temporary water service.
 - 8. Temporary sanitary facilities.
- B. Construction Facilities:
 - 1. Field offices and sheds.
 - 2. Vehicular access.
 - 3. Parking.
 - 4. Progress cleaning and waste removal.
 - 5. Project identification.
 - 6. Fire prevention facilities.
- C. Temporary Controls:
 - 1. Barriers.
 - 2. Enclosures and fencing.
 - 3. Security.
 - 4. Water control.
 - 5. Dust control.
 - 6. Erosion and sediment control.
 - 7. Pest control.
- D. Removal of utilities, facilities, and controls.

1.2 TEMPORARY ELECTRICITY

- A. Provide and pay for power service required from utility source as needed for construction operation.
- B. Provide power outlets, with branch wiring and distribution boxes located as required for construction operations. Provide flexible power cords as required for portable construction tools and equipment.
- C. Provide main service disconnect and over-current protection at convenient location.
- D. Permanent convenience receptacles may not be utilized during construction.
- E. Provide distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.

1.3 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

- A. Provide and maintain lighting for construction operations to achieve minimum lighting levels which will ensure safety and maintain the specified levels of quality and craftsmanship.
- B. Provide and maintain 1 watt/sq ft lighting to exterior staging and storage areas after dark for security purposes.

- C. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps for specified lighting levels.
- D. Maintain lighting and provide routine repairs.
- E. Permanent building lighting may not be utilized during construction.

1.4 TEMPORARY HEATING

- A. Provide and pay for heating devices and heat as needed to maintain specified conditions for construction operations.
- B. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in product sections.

1.5 TEMPORARY COOLING

- A. Provide and pay for cooling devices and cooling as needed to maintain specified conditions for construction operations.
- B. Maintain maximum ambient temperature of 80 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

1.6 TEMPORARY VENTILATION

- A. Ventilate enclosed areas to achieve curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

1.7 TEMPORARY COMMUNICATION SERVICE

- A. Provide, maintain, and pay for telephone service to field office at time of project mobilization.
- B. Provide, maintain, and pay for secure wireless computer network (wi-fi) service to field office at time of project mobilization.

1.8 TEMPORARY WATER SERVICE

- A. Provide and pay for suitable quality water service as needed to maintain specified conditions for construction operations.
- B. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

1.9 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Existing facility use is not permitted. Provide facilities at time of project mobilization.

1.10 FIELD OFFICES AND SHEDS

- A. Office: Weather tight, with lighting, electrical outlets, heating, cooling and ventilating equipment, and equipped with sturdy furniture drawing rack, and drawing display table.
- B. Provide space for Project meetings, with table and chairs to accommodate 6 persons.

- C. Storage Areas And Sheds: Size to storage requirements for products of individual Sections, allowing for access and orderly provision for maintenance and for inspection of products to requirements of Section 01 60 00 - Product Requirements.
 - 1. Provide heating and ventilation as needed to maintain products in accordance with Contract Documents; lighting for maintenance and inspection of products.
- D. Preparation: Fill and grade sites for temporary structures sloped for drainage away from buildings.
- E. Removal: At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.

1.11 VEHICULAR ACCESS

- A. Construct temporary access roads from public thoroughfares to serve construction area, of width and load bearing capacity to accommodate unimpeded traffic for construction purposes.
- B. Construct temporary bridges and culverts to span low areas and allow unimpeded drainage.
- C. Extend and relocate vehicular access as Work progress requires, provide detours as necessary for unimpeded traffic flow.
- D. Provide unimpeded access for emergency vehicles. Maintain 20 feet wide driveways with turning space between and around combustible materials.
- E. Provide and maintain access to fire hydrants and control valves free of obstructions.
- F. Provide means of removing mud from vehicle wheels before entering streets.
- G. Do not use existing roads for construction traffic.

1.12 PARKING

- A. Provide temporary surface parking areas to accommodate construction personnel.
- B. When site space is not adequate, provide additional off-site parking.
- C. Mud From Site Vehicles: Provide means of removing mud from vehicle wheels before entering streets.

1.13 PROGRESS CLEANING AND WASTE REMOVAL

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing spaces.
- C. Broom and vacuum clean interior areas prior to start of surface finishing and continue cleaning to eliminate dust.

- D. Collect and remove waste materials, debris, and rubbish from site periodically and dispose off-site.

1.14 PROJECT IDENTIFICATION

- A. Project Identification Sign:
 - 1. One painted sign; 32 sq ft area; bottom mounted 6 feet above ground.
 - 2. Content:
 - a. Project title, logo and name of Owner as indicated on Contract Documents.
 - b. Names and titles of authorities.
 - c. Names and titles of Architect and Consultants.
 - d. Name of Prime Contractor.
 - 3. Graphic Design, Colors, Style of Lettering: Designated by Architect.
- B. Project Informational Signs:
 - 1. Painted informational signs of same colors and lettering as Project Identification sign, or standard products; size lettering for legibility at 100 feet distance.
 - 2. Provide sign at each field office, storage shed, and directional signs to direct traffic into and within site. Relocate as Work progress requires.
 - 3. Provide municipal or state traffic agency directional traffic signs to and within site as required.
 - 4. No other signs are allowed without Owner permission except those required by law.
- C. Design sign and structure to withstand 60 miles/hr wind velocities.
- D. Sign Painter: Experienced as professional sign painter for minimum three years.
- E. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.
- F. Show content, layout, lettering, color, foundation, structure, sizes, and grades of members.
- G. Sign Materials:
 - 1. Structure and Framing: New, wood, structurally adequate.
 - 2. Sign Surfaces: Exterior grade plywood with medium density overlay, minimum 3/4 inches thick, standard large sizes to minimize joints.
 - 3. Rough Hardware: Galvanized, aluminum or brass.
 - 4. Paint and Primers: Exterior quality, two coats; sign background of color as selected.
 - 5. Lettering: Exterior quality paint or pre-cut vinyl self-adhesive products, contrasting colors as selected.
- H. Installation:
 - 1. Install project identification sign within 15 days after date fixed by Notice to Proceed.
 - 2. Erect at designated location.

3. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.
 4. Install sign surface plumb and level, with butt joints. Anchor securely.
 5. Paint exposed surfaces of sign, supports, and framing.
- I. Maintenance: Maintain signs and supports clean, repair deterioration and damage.
 - J. Removal: Remove signs, framing, supports, and foundations at completion of Project and restore area.

1.15 FIRE PREVENTION FACILITIES

- A. Prohibit smoking with buildings under construction and demolition. Designate area on site where smoking is permitted. Provide approved ashtrays in designated smoking areas.
- B. Establish fire watch for cutting and welding and other hazardous operations capable of starting fires. Maintain fire watch before, during, and after hazardous operations until threat of fire does not exist.
- C. Portable Fire Extinguishers: NFPA 10; 10-pound capacity, 4A-60B; C UL rating.
 1. Provide one fire extinguisher at each stair on each floor of buildings under construction and demolition.
 2. Provide minimum one fire extinguisher in every construction trailer and storage shed.
 3. Provide minimum one fire extinguisher on roof during roofing operations using heat producing equipment.

1.16 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas and to protect adjacent properties from damage from construction operations and demolition.
- B. Provide barricades and covered walkways when required by authorities having jurisdiction for public rights-of-way.
- C. Provide protection for plants designated to remain. Replace damaged plants.
- D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.17 ENCLOSURES AND FENCING

- A. Provide 6 feet high fence around construction site; equip with vehicular and pedestrian gates with locks.
- B. Exterior Enclosures:
 1. Provide temporary weather tight closure of exterior openings to accommodate acceptable working conditions and protection for products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to

prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

2. Provide temporary protection of existing wall cavities, substrates, and surface exposed to weather during cutting and minor demolition operations to prevent entrapment of moisture and development of mildew.

1.18 SECURITY

- A. Security Program:
 1. Protect Work and existing premises from theft, vandalism, and unauthorized entry.
 2. Initiate program at project mobilization.
 3. Maintain program throughout construction period until Owner occupancy.
- B. Entry Control:
 1. Restrict entrance of persons and vehicles into Project site.
 2. Allow entrance only to authorized persons with proper identification.
 3. Maintain log of workers and visitors, make available to Owner on request.

1.19 WATER CONTROL

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

1.20 DUST CONTROL

- A. Execute Work by methods to minimize raising dust from construction operations.
- B. Provide positive means to prevent air-borne dust from dispersing into atmosphere.

1.21 EROSION AND SEDIMENT CONTROL

- A. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
- B. Minimize surface area of bare soil exposed at one time.
- C. Provide temporary measures including berms, dikes, and drains, and other devices to prevent water flow.
- D. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
- E. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

1.22 PEST CONTROL

- A. Provide methods, means, and facilities to prevent pests, rodents and insects from damaging the Work and entering facility.

1.23 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.
- B. Remove underground installations to minimum depth of 2 feet. Grade site as indicated on Drawings.
- C. Clean and repair damage caused by installation or use of temporary work.

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

PART 2 PRODUCTS - NOT USED**PART 3 EXECUTION - NOT USED****END OF SECTION**

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Products.
- B. Product delivery requirements.
- C. Product storage and handling requirements.
- D. Product options.
- E. Product substitution procedures.

1.2 PRODUCTS

- A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.
- B. Furnish new materials, machinery, components, equipment, fixtures, and systems to be installed in and form a part of the Work unless specified otherwise.
- C. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.
- D. Furnish interchangeable components from same manufacturer for components being replaced.

1.3 PRODUCT DELIVERY REQUIREMENTS

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

- A. Store and protect products in accordance with manufacturers' instructions.
- B. Store with seals and labels intact and legible.
- C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- D. For exterior storage of fabricated products, place on sloped supports above ground.
- E. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- G. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.

- H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.5 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Products of one of manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit request for substitution for any manufacturer not named in accordance with the following article.

1.6 PRODUCT SUBSTITUTION PROCEDURES

- A. Architect will consider requests for Substitutions only within 30 days after date established in Notice to Proceed. Approval of Substitutions will be at the sole discretion of the Architect and the Owner. The Architect's decision will be final.
- B. Substitutions may be considered when a product becomes unavailable or if, in the opinion of the Architect, its use would adversely impact the construction schedule, through no fault of Contractor.
- C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- D. A request constitutes a representation that Bidder/Contractor:
 - 1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
 - 2. Will provide same warranty for Substitution as for specified product.
 - 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
 - 5. Will reimburse Owner and Architect for review or redesign services associated with re-approval by authorities having jurisdiction.

- E. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals, without separate written request, or when acceptance will require revision to Contract Documents.
- F. Substitution Submittal Procedure:
 - 1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
 - 2. Submit shop drawings, product data, technical information, certified test results attesting to the proposed Product equivalence, and any other information necessary or requested by the Architect to

allow a review and determination of equivalence without additional research by the Architect. All information and data submitted shall be in a format similar to that of the information available to the Architect on the specified product in order to allow comparison. Burden of proof is on the proposer.

- 3. Architect will notify Contractor in writing of decision to accept or reject request.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 70 00
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Closeout procedures.
- B. Final cleaning.
- C. Starting of systems.
- D. Demonstration and instructions.
- E. Testing, adjusting and balancing.
- F. Protecting installed construction.
- G. Project record documents.
- H. Operation and maintenance data.
- I. Manual for materials and finishes.
- J. Manual for equipment and systems.
- K. Spare parts and maintenance products.
- L. Product warranties and product bonds.

1.2 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect/Engineer's review.
- B. Provide submittals to Architect that are required by authorities having jurisdiction.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.3 FINAL CLEANING

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

1.4 STARTING OF SYSTEMS

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Architect seven days prior to start-up of each item.
- C. Verify each piece of equipment or system has been checked for proper lubrication, drive

rotation, belt tension, control sequence, and for conditions which may cause damage.

- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by equipment or system manufacturer.
- E. Verify wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable manufacturer's representative and Contractors' personnel in accordance with manufacturers' instructions.
- G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. Submit a written report in accordance with Section 01 33 00 - Submittal Procedures that equipment or system has been properly installed and is functioning correctly.

1.5 DEMONSTRATION AND INSTRUCTIONS

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

1.6 TESTING, ADJUSTING AND BALANCING

- A. Owner will appoint, employ, and pay for services of independent firm to perform testing, adjusting, and balancing.
- B. Independent firm will perform services specified in Section 23 05 93.
- C. Reports will be submitted by independent firm to Architect/Engineer indicating observations

and results of tests and indicating compliance or non-compliance with requirements of Contract Documents.

1.7 PROTECTING INSTALLED CONSTRUCTION

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

1.8 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed Shop Drawings, Product Data, and Samples.
 - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress, not less than weekly.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates utilized.
 - 3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Measured depths of foundations in relation to finish floor datum.
 - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

- 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
- 4. Field changes of dimension and detail.
- 5. Details not on original Contract drawings.
- G. Submit documents to Architect/Engineer [with claim for final Application for Payment.

1.9 OPERATION AND MAINTENANCE DATA

- A. Submit data bound in 8-1/2 x 11-inch (A4) text pages, three D side ring binders with durable plastic covers.
- B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.
- C. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- D. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- E. Contents: Prepare Table of Contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:
 - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.
 - 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
 - 3. Part 3: Project documents and certificates, including the following:
 - a. Shop drawings and product data.
 - b. Air and water balance reports.
 - c. Certificates.
 - d. Originals of warranties and bonds.

1.10 MANUAL FOR MATERIALS AND FINISHES

- A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect/Engineer will review draft and return one copy with comments.
- B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.
- C. Submit one copy of completed volumes 15 days prior to final inspection. Draft copy to be reviewed and returned after final inspection, with Architect/Engineer comments. Revise content of document sets as required prior to final submission.
- D. Submit two sets of revised final volumes in final form within 10 days after final inspection.
- E. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Include information for re-ordering custom manufactured products.
- F. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- G. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Include recommendations for inspections, maintenance, and repair.
- H. Additional Requirements: As specified in individual product specification sections.
- I. Include listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.11 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect/Engineer will review draft and return one copy with comments.
- B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.
- C. Submit one copy of completed volumes 15 days prior to final inspection. Draft copy is to be reviewed and returned after final inspection, with Architect/Engineer comments. Revise content of document sets as required prior to final submission.

- D. Submit two sets of revised final volumes in final form within 10 days after final inspection.
- E. Each Item of Equipment and Each System: Include description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.
- F. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed by label machine.
- G. Include color coded wiring diagrams as installed.
- H. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut down, and emergency instructions. Include summer, winter, and special operating instructions.
- I. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- J. Include servicing and lubrication schedule, and list of lubricants required.
- K. Include manufacturer's printed operation and maintenance instructions.
- L. Include sequence of operation by controls manufacturer.
- M. Include original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- N. Include control diagrams by controls manufacturer as installed.
- O. Include Contractor's coordination drawings, with color coded piping diagrams as installed.
- P. Include charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- Q. Include list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- R. Include test and balancing reports as specified in Section 01 40 00 - Quality Requirements.
- S. Additional Requirements: As specified in individual product specification sections.
- T. Include listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

1.12 SPARE PARTS AND MAINTENANCE PRODUCTS

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

1.13 PRODUCT WARRANTIES AND PRODUCT BONDS

- A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
- B. Execute and assemble transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers.
- C. Verify documents are in proper form, contain full information, and are notarized.
- D. Co-execute submittals when required.

- E. Include Table of Contents and assemble in three D side ring binder with durable plastic cover.
- F. Submit prior to final Application for Payment.
- G. Time of Submittals:
 - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.
 - 2. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
 - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing date of acceptance as beginning of warranty or bond period.

PART 2 PRODUCTS - NOT USED**PART 3 EXECUTION - NOT USED**

END OF SECTION

DIVISION 2

EXISTING CONDITIONS

THE AGREEMENT, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, SUPPLEMENTARY CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, AND ALL ADDENDA ARE A PART OF THE CONTRACT. THE CONTRACTOR SHALL CONSULT THEM IN DETAIL FOR INSTRUCTIONS PERTAINING TO THE WORK. THE CONTRACTOR SHALL ALSO CONSULT ALL OTHER DIVISIONS AND SECTIONS OF THE PROJECT MANUAL, AND ALL DRAWINGS IN THE EXECUTION OF THE WORK OF THE CONTRACT.

THE CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, SYSTEMS, EQUIPMENT, ITEMS, ARTICLES, OPERATIONS, AND/OR METHODS LISTED, IMPLIED, MENTIONED, OR SCHEDULED IN THE CONTRACT DOCUMENTS AND/OR NECESSARY AND/OR REQUIRED FOR THE SATISFACTORY COMPLETION OF THE WORK.

THE LISTING OF WORK, REQUIREMENTS, AND PRODUCTS IN THIS SECTION IS NOT INTENDED TO BE CONCLUSIVE. THE CONTRACTOR SHALL CHECK ALL OTHER PARTS OF THE CONTRACT DOCUMENTS AND SHALL PROVIDE ALL MISCELLANEOUS ITEMS OF WORK AND PRODUCTS NECESSARY FOR THE SATISFACTORY COMPLETION OF THE WORK DESCRIBED IN THE CONTRACT DOCUMENTS.

SECTION 02 41 19
SELECTIVE BUILDING DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Demolishing designated building equipment and fixtures.
 - 2. Demolishing designated construction.
 - 3. Cutting and alterations for completion of the Work.
 - 4. Protecting items designated to remain.
 - 5. Removing demolished materials.

1.2 QUALITY ASSURANCE

- A. Conform to applicable code for demolition work, dust control, products requiring electrical disconnection and re-connection.
- B. Conform to applicable code for procedures when hazardous or contaminated materials are discovered.
- C. Obtain required permits from authorities having jurisdiction.

1.3 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.4 SCHEDULING

- A. Section 01 30 00 - Administrative Requirements: Requirements for scheduling.
- B. Schedule Work to coincide with new construction.
- C. Cooperate with Owner in scheduling noisy operations and waste removal that may impact Owners operation in adjoining spaces.
- D. Perform noisy work:
 - 1. Between hours of 7:00 AM and 7:00 PM.

1.5 PROJECT CONDITIONS

- A. Conduct demolition to minimize interference with adjacent building areas.
- B. Cease operations immediately if structure appears to be in danger and notify Architect/Engineer. Do not resume operations until directed.

PART 2 - PRODUCTS

2.1 Not Used.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Notify affected utility companies before starting work and comply with their requirements.

- B. Mark location and termination of utilities.
- C. Erect, and maintain temporary barriers and security devices, including warning signs and lights, and similar measures, for protection of the public, Owner, and existing improvements indicated to remain.
- D. Erect and maintain weatherproof closures for exterior openings.

3.2 DEMOLITION

- A. Conduct demolition to minimize interference with adjacent building areas.
- B. Maintain protected egress from and access to adjacent existing buildings at all times.
- C. Do not close or obstruct roadways without permits.
- D. Cease operations immediately when structure appears to be in danger and notify Architect/Engineer.
- E. Disconnect and remove designated utilities within demolition areas.
- F. Cap and identify abandoned utilities at termination points when utility is not completely removed. Annotate Record Drawings indicating location and type of service for capped utilities remaining after demolition.
- G. Demolish in orderly and careful manner. Protect existing improvements, supporting structural members and portions of building elements indicated to remain.
- H. Carefully remove building components indicated to be reused.
 - 1. Disassemble components as required to permit removal.
 - 2. Package small and loose parts to avoid loss.
 - 3. Mark components and packaged parts to permit reinstallation.
 - 4. Store components, protected from construction operations, until reinstalled.
- I. Remove demolished materials from site except where specifically noted otherwise. Do not burn or bury materials on site.
- J. Remove materials as Work progresses. Upon completion of Work, leave areas in clean condition.
- K. Remove temporary Work.

END OF SECTION

DIVISION 3

CONCRETE

THE AGREEMENT, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, SUPPLEMENTARY CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, AND ALL ADDENDA ARE A PART OF THE CONTRACT. THE CONTRACTOR SHALL CONSULT THEM IN DETAIL FOR INSTRUCTIONS PERTAINING TO THE WORK. THE CONTRACTOR SHALL ALSO CONSULT ALL OTHER DIVISIONS AND SECTIONS OF THE PROJECT MANUAL, AND ALL DRAWINGS IN THE EXECUTION OF THE WORK OF THE CONTRACT.

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SECTION 03 10 00

CONCRETE FORMS AND ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Formwork for cast-in place concrete.
 - 2. Shoring, bracing, and anchorage.
 - 3. Architectural form liners.
 - 4. Form accessories.
 - 5. Form stripping.
- B. Related Sections:
 - 1. Section 032000 - Concrete Reinforcement.
 - 2. Section 033000 - Cast-in-Place Concrete.

1.2 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
 - 2. ACI 301 - Specifications for Structural Concrete.
 - 3. ACI 318 - Building Code Requirements for Structural Concrete.
 - 4. ACI 347 - Guide to Formwork for Concrete.
- B. American Forest and Paper Association:
 - 1. AF&PA - National Design Specifications for Wood Construction.
- C. The Engineered Wood Association:
 - 1. APA/EWA PS 1 - Voluntary Product Standard for Construction and Industrial Plywood.

- D. ASTM International:
 - 1. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - 2. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
- E. West Coast Lumber Inspection Bureau:
 - 1. WCLIB - Standard Grading Rules for West Coast Lumber.

1.3 DESIGN REQUIREMENTS

- A. Design, engineer and construct formwork, shoring and bracing in accordance with ACI 318 to conform to design and applicable code requirements to achieve concrete shape, line and dimension as indicated on Drawings.

1.4 PERFORMANCE REQUIREMENTS

- A. Vapor Retarder Permeance: Maximum .03 perms when tested in accordance with ASTM E96, Procedure A.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 347 ACI 301 ACI 318.
- B. For wood products furnished for work of this Section, comply with AF&PA.
- C. Perform Work in accordance with State Municipality of

Highways Public Work's standard.

1.6 COORDINATION

- A. Section 013000 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate this Section with other sections of work, requiring attachment of components to formwork.

PART 2 PRODUCTS

2.1 WOOD FORM MATERIALS

- A. Form Materials: At discretion of Contractor.

2.2 FORMWORK ACCESSORIES

- A. Vapor Retarder: Where indicated on Drawings, 10 mil thick polyethylene sheet manufacture by:
 - 1. Stego Wrap Class A: by Stego Industries LLC (887) 464-7834
 - 2. Griffolyn by Reef Industries (800) 231-6074
 - 3. VaporBlock 10 by Raven Industries (800) 635-3456
 - 4. Perminator Vapor – May by W.R. Meadows (800) 342-5976
 - 5. Xtreme by Tex-Trude (281) 452-5961
 - 6. Or Equivalent
- B. Bituminous Joint Filler: ASTM D1751.
- C. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Size, strength and character to maintain formwork in place while placing concrete.

- D. Water Stops: Rubber Polyvinyl chloride, minimum 1,750 psi tensile strength, minimum 50 degrees F to plus 175 degrees F working temperature range, inch wide, maximum possible lengths, ribbed profile, preformed corner sections, heat welded jointing.

***** OR *****

- E. Waterstop: Flexible strip of bentonite waterproofing compound in coil form for joints in concrete construction.
 - 1. Colloid Environmental Technologies Company Model.
 - 2. TC MiraDRI Model.
 - 3. Paramount Technical Products Model.
 - 4. Substitutions: Section 016000 - Product Requirements Not Permitted.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 013000 - Administrative Requirements: Coordination and project conditions.
- B. Verify lines, levels, and centers before proceeding with formwork. Verify dimensions agree with Drawings.
- C. When formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Architect/Engineer.

3.2 INSTALLATION

- A. Earth Forms:
 - 1. Earth forms are not permitted.

<p>B. Formwork - General:</p> <ol style="list-style-type: none"> 1. Provide top form for sloped surfaces steeper than 1.5 horizontal to 1 vertical to hold shape of concrete during placement, unless it can be demonstrated that top forms can be omitted. 2. Construct forms to correct shape and dimensions, mortar-tight, braced, and of sufficient strength to maintain shape and position under imposed loads from construction operations. 3. Camber forms where necessary to produce level finished soffits unless otherwise shown on Drawings. 4. Carefully verify horizontal and vertical positions of forms. Correct misaligned or misplaced forms before placing concrete. 5. Complete wedging and bracing before placing concrete. 	<ol style="list-style-type: none"> 6. Use care in forming and stripping wood forms to protect corners and edges. 7. Level and continue horizontal joints. 8. Keep wood forms wet until stripped. <p>D. Erect formwork, shoring, and bracing to achieve design requirements, in accordance with requirements of ACI 301 ACI 318.</p> <p>E. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.</p> <p>F. Obtain Architect/Engineer's approval before framing openings in structural members not indicated on Drawings.</p> <p>G. Install fillet and chamfer strips on external corners of beams joists columns and.</p> <p>H. Install void forms in accordance with manufacturer's recommendations.</p>
<p>C. Forms for Smooth Finish Concrete:</p> <ol style="list-style-type: none"> 1. Use steel, plywood or lined board forms. 2. Use clean and smooth plywood and form liners, uniform in size, and free from surface and edge damage capable of affecting resulting concrete finish. 3. Install form lining with close-fitting square joints between separate sheets without springing into place. 4. Use full size sheets of form lines and plywood wherever possible. 5. Tape joints to prevent protrusions in concrete. 	<ol style="list-style-type: none"> 1. SureVoid Products, Inc., Englewood, CO (800) 458-5444. <p>I. Do not reuse wood formwork more than times for concrete surfaces to be exposed to view. Do not patch formwork.</p> <p>3.3 APPLICATION - FORM RELEASE AGENT</p> <p>A. Apply form release agent on formwork in accordance with manufacturer's recommendations.</p> <p>B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.</p>

<p>C. Do not apply form release agent where concrete surfaces are indicated to receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.</p> <p>D. Reuse and Coating of Forms: Thoroughly clean forms and reapply form coating before each reuse. For exposed work, do not reuse forms with damaged faces or edges. Apply form coating to forms in accordance with manufacturer's specifications. Do not coat forms for concrete indicated to receive "scored finish". Apply form coatings before placing reinforcing steel.</p>	<p>F. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.</p> <p>G. Form Ties:</p> <ol style="list-style-type: none"> 1. Use sufficient strength and sufficient quantity to prevent spreading of forms. 2. Place ties at least 1 inch away from finished surface of concrete. 3. Leave inner rods in concrete when forms are stripped. 4. Space form ties equidistant, symmetrical and aligned vertically and horizontally unless otherwise shown on Drawings.
<p>3.4 INSTALLATION - INSERTS, EMBEDDED PARTS, AND OPENINGS</p> <p>A. Install formed openings for items to be embedded in or passing through concrete work.</p> <p>B. Locate and set in place items required to be cast directly into concrete.</p> <p>C. Coordinate with Work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.</p> <p>D. Install accessories straight, level, and plumb. Ensure items are not disturbed during concrete placement.</p> <p>E. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.</p>	<p>H. Arrangement: Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.</p> <p>I. Construction Joints:</p> <ol style="list-style-type: none"> 1. Install surfaced pouring strip where construction joints intersect exposed surfaces to provide straight line at joints. 2. Just prior to subsequent concrete placement, remove strip and tighten forms to conceal shrinkage. 3. Show no overlapping of construction joints. Construct joints to present same appearance as butted plywood joints. 4. Arrange joints in continuous line straight, true and sharp. <p>J. Openings for Items Passing Through Concrete:</p>

<ol style="list-style-type: none"> 1. Frame openings in concrete where indicated on Drawings. Establish exact locations, sizes, and other conditions required for openings and attachment of work specified under other sections. 2. Coordinate work to avoid cutting and patching of concrete after placement. 3. Perform cutting and repairing of concrete required as result of failure to provide required openings. 	<ol style="list-style-type: none"> 2. effective cleaning of loose dirt, debris and waste material. Clean forms and surfaces against which concrete is to be placed. Remove chips, saw dust and other debris. Thoroughly blow out forms with compressed air just before concrete is placed.
<p>K. Screeds:</p> <ol style="list-style-type: none"> 1. Set screeds and establish levels for tops of concrete slabs and levels for finish on slabs. 2. Slope slabs to drain where required or as shown on Drawings. 3. Before depositing concrete, remove debris from space to be occupied by concrete and thoroughly wet forms. Remove freestanding water. 	<p>3.5 FORM CLEANING</p> <ol style="list-style-type: none"> A. Clean forms as erection proceeds, to remove foreign matter within forms. B. Clean formed cavities of debris prior to placing concrete. C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
<p>L. Scream Supports:</p> <ol style="list-style-type: none"> 1. For concrete over waterproof membranes and vapor retarder membranes, use cradle, pad or base type screed supports which will not puncture membrane. 2. Staking through membrane is not be permitted. <p>M. Cleanouts and Access Panels:</p> <ol style="list-style-type: none"> 1. Provide removable cleanout sections or access panels at bottoms of forms to permit inspection and 	<p>3.6 FORM REMOVAL</p> <ol style="list-style-type: none"> A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads and removal has been approved by Architect/Engineer. B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view. C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms. D. Leave forms in place for minimum number of days as specified in ACI 347.

3.7 ERECTION TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 301 ACI 318.

***** OR *****

- B. Camber slabs and beams 1/4 inch per 10 feet in accordance with ACI 301 ACI 318.

3.8 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements 017000 - Execution Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.
- C. Notify Architect/Engineer after placement of reinforcing steel in forms, but prior to placing concrete.
- D. Schedule concrete placement to permit formwork inspection before placing concrete.

END OF SECTION

SECTION 03 20 00

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Reinforcing bars.
 2. Welded wire fabric.
 3. Reinforcement accessories.
- B. Related Sections:
1. Section 031000 - Concrete Forms and Accessories.
 2. Section 033000 - Cast-in-Place Concrete.
 3. Section 033500 - Concrete: Reinforcement for concrete floor toppings.

1.2 REFERENCES

- A. American Concrete Institute:
1. ACI 301 - Specifications for Structural Concrete.
 2. ACI 318 - Building Code Requirements for Structural Concrete.
 3. ACI 530.1 - Specifications for Masonry Structures.
 4. ACI SP-66 - ACI Detailing Manual.
- B. ASTM International:
1. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 2. ASTM A184/A184M - Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
 3. ASTM A496 - Standard Specification for Steel Wire, Deformed, for

4. Concrete Reinforcement.
5. ASTM A497 - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
6. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
7. ASTM A704/A704M - Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement.
8. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
9. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
10. ASTM A775/A775M - Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
11. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Fabric for Reinforcement.
12. ASTM A934/A934M - Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.
13. ASTM A996/A996M - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.

<p>13. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Reinforcing Steel Bars.</p> <p>C. American Welding Society:</p> <p>1. AWS D1.4 - Structural Welding Code - Reinforcing Steel.</p> <p>D. Concrete Reinforcing Steel Institute:</p> <p>1. CRSI - Manual of Standard Practice.</p> <p>2. CRSI - Placing Reinforcing Bars.</p>	<p>1.5 QUALIFICATIONS</p> <p>A. Welders: AWS qualified within previous 12 months.</p> <p>1.6 COORDINATION</p> <p>A. Section 013000 - Administrative Requirements: Coordination and project conditions.</p> <p>B. Coordinate with placement of formwork, formed openings and other Work.</p>
<p>1.3 SUBMITTALS</p> <p>A. Section 013300 - Submittal Procedures: Submittal procedures.</p> <p>B. Shop Drawings: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel and welded wire fabric, bending and cutting schedules, and supporting and spacing devices.</p> <p>C. Certificates: Submit AWS qualification certificate for welders employed on the Work.</p> <p>D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.</p> <p>1. Submit certified copies of mill test report of reinforcement materials analysis.</p>	<p>PART 2 PRODUCTS</p> <p>2.1 REINFORCEMENT</p> <p>A. Deformed and Plain Reinforcement: ASTM A615/A615M; 60 ksi yield strength, steel bars, unfinished.</p> <p>2.2 ACCESSORY MATERIALS</p> <p>A. Tie Wire: Minimum 16 gage annealed.</p> <p>B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor retarder puncture.</p> <p>C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic tipped steel; size and shape to meet Project conditions.</p>
<p>1.4 QUALITY ASSURANCE</p> <p>A. Perform Work in accordance with CRSI - Manual of Standard Practice, ACI 301, and ACI 318.</p> <p>B. Prepare shop drawings in accordance with ACI SP-66.</p>	<p>D. Reinforcing Splicing Devices: Mechanical type; full tension and compression; sized to fit joined reinforcing.</p> <p>E. Epoxy Coating Patching Material: Type as recommended by coating manufacturer.</p>

2.3 FABRICATION

- A. Fabricate concrete reinforcement in accordance with CRSI Manual of Practice, and ACI 318, on and all applicable codes.
- B. Form standard hooks for 180 degree bends, 90 degree bend, stirrup and tie hooks, and seismic hooks as indicated on Drawings.
- C. Form reinforcement bends with minimum diameters in accordance with ACI 318 and all applicable codes.
- D. Fabricate column reinforcement with offset bends at reinforcement splices.
- E. Form spiral column reinforcement from minimum 3/8 inch diameter continuous deformed bar or wire.
- F. Form ties and stirrups from the following:
 - 1. For bars No. 10 and Smaller: No. 3 deformed bars.
 - 2. For bars No. 11 and Larger: No. 4 deformed bars.
- G. Weld reinforcement in accordance with AWS D1.4.
- H. Galvanized Epoxy-Coated Reinforcement: Clean surfaces, weld and re-protect welded joint in accordance with CRSI.
- I. Locate reinforcement splices not indicated on Drawings, at point of minimum stress. Review location of splices with Architect/Engineer.

2.4 SOURCE QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Testing, inspection and analysis requirements.
- B. Make completed reinforcement available for inspection at manufacturer's factory prior to packaging for shipment. Notify Architect/Engineer at least seven days before inspection is allowed.
- C. When fabricator is approved by authority having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
 - 1. Specified shop tests are not required for Work performed by approved fabricator.

PART 3 EXECUTION**3.1 PLACEMENT**

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position beyond specified tolerance.
 - 1. Do not weld crossing reinforcement bars for assembly.
- B. Do not displace or damage vapor retarder.
- C. Accommodate placement of formed openings.
- D. Space reinforcement bars with minimum clear spacing in accordance with ACI 318 of one bar diameter, but not less than 1 inch.
 - 1. Where bars are indicated in multiple layers, place upper bars

directly above lower bars.

- E. Maintain concrete cover around reinforcement in accordance with ACI 318 applicable code as follows:

Footings and Concrete Formed Against Earth		3 inches
Concrete exposed to earth or weather	No. 6 bars and larger	2 inches
	No. 5 bars and smaller	1-1/2 inches
Supported Slabs, Walls, and Joists	No. 14 bars and larger	1-1/2 inches
	No. 11 bars and smaller	3/4 inches
Beams and Columns		1-1/2 inches
Shell and Folded Plate Members	No. 6 bars and larger	3/4 inches
	No. 5 bars and smaller	1/2 inches

3.2 ERECTION TOLERANCES

- A. Section 014000 - Quality Requirements: Tolerances.
- B. Install reinforcement within the following tolerances for flexural members, walls, and compression members:

Reinforcement Depth	Depth Tolerance	Concrete Cover Tolerance
Greater than 8 inches	plus or minus 3/8 inch	minus 3/8 inch
Less than 8 inches	plus or minus 1/2 inch	minus 1/2 inch

- C. Install reinforcement within the tolerances specified in ACI 530.1 for foundation walls.

3.3 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Field inspection and testing will be performed by Owner's testing laboratory in accordance with ACI 318 and IBC 2006.
- C. Provide free access to Work and cooperate with appointed firm.
- D. Reinforcement Inspection:
1. Placement
Acceptance: Specified and ACI 318 material requirements and specified placement tolerances.
 2. Welding: Inspect welds in accordance with AWS D1.1.
 3. Periodic Placement Inspection: Inspect for correct materials, fabrication, sizes, locations, spacing, concrete cover, and splicing.
 4. Weldability Inspection: Inspect for reinforcement weldability when formed from steel other than ASTM A706/A706M.
 5. Continuous Weld Inspection: Inspect reinforcement as required by ACI 318.
 6. Periodic Weld Inspection: Other welded connections.

3.4 SCHEDULES

- A. Reinforcement For
Superstructure Framing
Members: Deformed bars,
unfinished.
- B. Reinforcement For Foundation
Wall Framing Members and Slab-
on-Grade: Deformed bars and
wire fabric, galvanized finish.
- C. Reinforcement For Parking
Structure Framing Members:
Deformed bars, epoxy-coated
finish.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete for the following:
1. Foundation walls.
 2. Supported slabs.
 3. Slabs on grade.
 4. Control, expansion and contraction joint devices.
 5. Equipment pads.
 6. Light pole base.
 7. Flagpole base.
- B. Related Sections:
1. Section 031000 - Concrete Forms and Accessories: Formwork and accessories. Placement of joint device joint device anchors in formwork.
 2. Section 032000 - Concrete Reinforcement.
 3. Section 033500 - Concrete Finishing.
 4. Section 033900 - Concrete Curing.

1.2 REFERENCES

- A. American Concrete Institute:
1. ACI 301 - Specifications for Structural Concrete.
 2. ACI 305 - Hot Weather Concreting.
 3. ACI 306.1 - Standard Specification for Cold Weather Concreting.
 4. ACI 308.1 - Standard Specification for Curing Concrete.
 5. ACI 318 - Building Code Requirements for Structural Concrete.

- B. ASTM International:
1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 2. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 3. ASTM C33 - Standard Specification for Concrete Aggregates.
 4. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 5. ASTM C42/C42M - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
 6. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
 7. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
 8. ASTM C150 - Standard Specification for Portland Cement.
 9. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
 10. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
 11. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

12.	ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.		Reinforced Concrete and Shotcrete.
13.	ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.	24.	ASTM C1157 - Standard Performance Specification for Hydraulic Cement.
14.	ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.	25.	ASTM C1218 - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
15.	ASTM C595 - Standard Specification for Blended Hydraulic Cements.	26.	ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.
16.	ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.	27.	ASTM D994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
17.	ASTM C685/C685M - Standard Specification for Concrete Made By Volumetric Batching and Continuous Mixing.	28.	ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
18.	ASTM C845 - Standard Specification for Expansive Hydraulic Cement.	29.	ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
19.	ASTM C989 - Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.	30.	ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
20.	ASTM C1017/C1017M - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.	31.	ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
21.	ASTM C1064/C1064M - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.	32.	ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
22.	ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).	33.	ASTM E1643 - Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or
23.	ASTM C1116 - Standard Specification for Fiber-		

34. Granular Fill under Concrete Slabs.
ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

1.3 PERFORMANCE REQUIREMENTS

- A. Vapor Retarder Permeance: Maximum .03 perm when tested in accordance with ASTM E96.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on joint devices, attachment accessories, admixtures.
- C. Design Data:
1. Submit concrete mix design for each concrete strength. Submit separate mix designs when admixtures are required for the following:
 - a. Hot and cold weather concrete work.
 - b. Air entrained concrete work.
 2. Identify mix ingredients and proportions, including admixtures.
 3. Identify chloride content of admixtures and whether or not chloride was added during manufacture.
- D. Manufacturer's Installation Instructions: Submit installation procedures and interface required with adjacent Work.

1.5 CLOSEOUT SUBMITTALS

- A. Section 017000 - Execution Requirements: Closeout procedures.
- B. Project Record Documents: Accurately record actual locations of embedded utilities and components concealed from view in finished construction.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301 and ACI 318.
- B. Conform to ACI 305 when concreting during hot weather.
- C. Conform to ACI 306.1 when concreting during cold weather.
- D. Acquire cement and aggregate from one source for Work.

1.7 COORDINATION

- A. Section 013000 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Section 016000 - Product Requirements: Environmental conditions affecting products on site.
- B. Maintain concrete temperature after installation at minimum 50 degrees F for minimum 7 days.

1.9 COORDINATION

- A. Section 013000 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

PART 2 PRODUCTS**2.1 CONCRETE MATERIALS**

- A. Cement: ASTM C150, Type I - Normal
- B. Normal Weight Aggregates: ASTM C33.
 - 1. Coarse Aggregate Maximum Size: 1.5
- C. Water: ACI 318; potable, without deleterious amounts of chloride ions.

2.2 ADMIXTURES

- A. Air Entrainment: ASTM C260.
- B. Fly Ash: ASTM C618 type C or F.
- C. Silica Fume: ASTM C1240.

2.3 ACCESSORIES

- A. Vapor Retarder: ASTM E1745 Class A; 10 mil thick; type recommended for below grade application. Furnish joint tape recommended by manufacturer.
- B. Non-Shrink Grout: ASTM C1107, premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.

2.4 JOINT DEVICES AND FILLER MATERIALS

- A. Joint Filler: Asphalt impregnated fiberboard or felt, tongue and groove profile.

***** OR *****
- B. Joint Filler: ASTM D1752; Closed cell, resiliency of 95 percent if not compressed more than 50 percent of original thickness.
- C. Sealant: ASTM C309, Type I approved by Asphalt and Vinyl composition Tile Institute, 30% minimum solids content.

2.5 CONCRETE MIX

- A. Select proportions for normal weight concrete in accordance with ACI 301 Method 1
- B. Provide concrete for the following criteria:

Material and Property	Measurement
Compressive Strength (7 day)	2100 psi
Compressive Strength (28 day)	3000 psi
Cement Type	ASTM C150
Aggregate Size (maximum)	1.5 inch
Air Content	Do not use air entrainment for concrete mixes.
Slump	5 inches

- C. Admixtures: Include admixture types and quantities indicated in concrete mix designs only when approved by Architect/Engineer.

1. Use accelerating admixtures in cold weather. Use of admixtures will not relax cold weather placement requirements.
 2. Do not use calcium chloride nor admixtures containing calcium chloride.
 3. Use set retarding admixtures during hot weather.
- D. Site Mixed Concrete: No site mixed concrete is allowed.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 013000 - Administrative Requirements: Coordination and project conditions.
- B. Verify requirements for concrete cover over reinforcement.
- C. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.

3.2 PREPARATION

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Remove laitance, coatings, and unsound materials.
- B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

- C. Remove debris and ice from formwork, reinforcement, and concrete substrates.
- D. Remove water from areas receiving concrete before concrete is placed.

3.3 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301.
- B. Notify testing laboratory and Architect/Engineer minimum 24 hours prior to commencement of operations.
- C. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints, and are not disturbed during concrete placement.
- D. Install vapor retarder under interior slabs on grade in accordance with ASTM E1643. Lap joints minimum 6 inches and seal watertight by adhesive applied between overlapping edges and ends as per manufacturer recommendations.
- E. Repair vapor retarder damaged during placement of concrete reinforcing. Repair with vapor retarder material; lap over damaged areas minimum 6 inches and seal watertight.
- F. Install construction joint devices in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- G. Install joint device anchors. Maintain correct position to allow joint cover to be flush with floor finish.

H.	Install joint covers in one piece longest practical length, when adjacent construction activity is complete.	premature drying, excessively hot or cold temperatures, and mechanical injury.
I.	Deposit concrete at final position. Prevent segregation of mix.	1. Protect concrete footings from freezing for minimum 5 days.
J.	Place concrete in continuous operation for each panel or section determined by predetermined joints.	B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
K.	Consolidate concrete.	C. Cure floor surfaces as specified in Section 03390.
L.	Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.	D. Ponding: Maintain 100 percent coverage of water over floor slab areas continuously for 7 days.
M.	Place concrete continuously between predetermined expansion, control, and construction joints.	E. Spraying: Spray water over floor slab areas and maintain wet for 7 days.
N.	Do not interrupt successive placement; do not permit cold joints to occur.	
O.	Saw cut joints within 12 hours after placing. Use 3/16 inch thick blade, cut into 1/4 depth of slab thickness.	
P.	Screed floors and slabs on grade level, maintaining surface flatness of F_r of 35.	
3.4	CONCRETE FINISHING	3.6 FIELD QUALITY CONTROL
A.	Finish concrete floor surfaces to requirements of Section 03350.	A. Section 014000 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.
B.	In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains.	B. Field inspection and testing will be performed by Owner's testing laboratory in accordance with ACI 318
		C. Provide free access to Work and cooperate with appointed firm.
		D. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of Work.
3.5	CURING AND PROTECTION	E. Concrete Inspections:
A.	Immediately after placement, protect concrete from	1. Continuous Placement Inspection: Inspect for proper installation procedures.
		2. Periodic Curing Inspection: Inspect for

	specified curing temperature and procedures.		
F.	<p>Strength Test Samples:</p> <ol style="list-style-type: none"> 1. Sampling Procedures: ASTM C172. 2. Cylinder Molding and Curing Procedures: ASTM C31/C31M, cylinder specimens, standard cured field cured. 3. Sample concrete and make one set of three cylinders for every 150 cu yds or less of each class of concrete placed each day and for every 5,000 sf of surface area for slabs and walls. 4. When volume of concrete for any class of concrete would provide less than 3 sets of cylinders, take samples from three randomly selected batches, or from every batch when less than 3 batches are used. 5. Make one additional cylinder during cold weather concreting, and field cure. 	H.	<p>Cylinder Compressive Strength Testing:</p> <ol style="list-style-type: none"> 1. Test Method: ASTM C39. 2. Test Acceptance: In accordance with ACI 318 . 3. Test one cylinder at 7 days. 4. Test two cylinders at 28 days. 5. Dispose remaining cylinders when testing is not required.
G.	<p>Field Testing:</p> <ol style="list-style-type: none"> 1. Slump Test Method: ASTM C143/C143M. 2. Air Content Test Method: ASTM C173/C173M. 3. Temperature Test Method: ASTM C1064/C1064M. 4. Measure slump and temperature for each compressive strength concrete sample. 5. Measure air content in air entrained concrete for each compressive strength concrete sample. 	I.	<p>Core Compressive Strength Testing:</p> <ol style="list-style-type: none"> 1. Sampling and Testing Procedures: ASTM C42/C42M. 2. Test Acceptance: In accordance with ACI 318. 3. Drill three cores for each failed strength test from concrete represented by failed strength test.
		J.	<p>Water Soluble Chloride Ion Concentration Test Method: ASTM C1218; tested at 28 days.</p> <ol style="list-style-type: none"> 1. Maximum Concentration: As permitted by applicable code.
		K.	<p>Maintain records of concrete placement. Record date, location, quantity, air temperature and test samples taken.</p>
		3.7	PATCHING
		A.	<p>Allow Architect/Engineer to inspect concrete surfaces immediately upon removal of forms.</p>
		B.	<p>Excessive honeycomb or embedded debris in concrete is not acceptable. Notify</p>

Architect/Engineer upon discovery.

- C. Patch imperfections as directed by Architect/Engineer

END OF SECTION

3.8 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. Repair or replacement of defective concrete will be determined by Architect/Engineer.
- C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect/Engineer for each individual area.

3.9 SCHEDULE - CONCRETE TYPES AND FINISHES

- A. Foundation Walls: 3,000 psi 28 day concrete, form finish with honeycomb filled surface.
- B. Underside of Supported Floors and Structure Exposed to View: 4,000 psi 28 day concrete, sack rubbed finish.
- C. Exposed Portico Structure: 4,000 psi 28 day concrete, air entrained, smooth stone rubbed finish.

3.10 SCHEDULE - JOINT FILLERS

- A. Basement Floor Slab Perimeter: Joint filler Type A set 1/8 inch below floor slab elevation.
- B. Exterior Retaining Wall at Loading Dock: Joint filler Type F recessed 3/8 inch with sealant cover.

SECTION 03 35 00

CONCRETE FINISHING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Finishing concrete floors [and floor toppings].
 - 2. Floor surface treatment.
- B. Related Sections:
 - 1. Section 033000 - Cast-in-Place Concrete: [Prepared concrete floors ready to receive finish;] [control and formed expansion and contraction joints and joint devices].
 - 2. Section 03360 - Concrete Finishes: Exposed aggregate finish.
 - 3. Section 033900 - Concrete Curing.
 - 4. Section 079513 - Expansion Joint Cover Assemblies.
 - 5. Section 079200 - Joint Sealers.

1.2 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 301 - Specifications for Structural Concrete.
 - 2. ACI 302.1 - Guide for Concrete Floor and Slab Construction.
- B. ASTM International:
 - 1. ASTM E1155 - Standard Test Method for Determining Floor Flatness and of Levelness Using the F-number System.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on concrete hardener, sealer, curing compounds curing papers and slip resistant treatment, compatibilities, and limitations.

1.4 CLOSEOUT SUBMITTALS

- A. Section 017000 - Execution Requirements: Closeout procedures.
- B. Operation and Maintenance Data: Submit data on maintenance renewal of applied coatings.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301 and ACI 302.1.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Product storage and handling requirements.
- B. Deliver materials in manufacturer's packaging including application instructions.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Section 016000 - Product Requirements: Environmental conditions affecting products on site.

1.8 COMPOUNDS - HARDENERS AND SEALERS

- A. Chemical Hardener: Magnesium fluorosilicate and zinc fluorosilicate blend

PART 2 EXECUTION**2.1 EXAMINATION**

- A. Section 013000 - Administrative Requirements: Coordination and project conditions.
- B. Verify floor surfaces are acceptable to receive the Work of this section.

2.2 FLOOR FINISHING

- A. Finish concrete floor surfaces in accordance with ACI 301 and ACI 302.1.
- B. Wood float surfaces receiving quarry tile, ceramic tile, and cementitious terrazzo with full bed setting system.
- C. Steel trowel surfaces receiving carpeting, resilient flooring, seamless flooring, thin set terrazzo, thin set quarry tile, and thin set ceramic tile.
- D. Steel trowel surfaces which are scheduled to be exposed.

2.3 TOLERANCES

- A. Section 014000 - Quality Requirements: Tolerances.
- B. Measure for F(F) and F(L) tolerances for floors in accordance with ASTM E1155, within 48 hours after slab installation.
- C. Finish concrete to achieve the following tolerances:

- 1. Under Glazed Tile on Setting Bed: F(F) 35 and F(L) 20.
- 2. Under Resilient Finishes: F(F) 75 and F(L) 50.
- 3. Exposed to View and Foot Traffic: F(F) 75 and F(L) 40.
- 4. Correct slab surface when actual F(F) or F(L) number for floor installation measures less than required.

- D. Correct defects in defined traffic floor by grinding or removal and replacement of defective Work. Areas requiring corrective Work will be identified. Re-measure corrected areas by same process.

END OF SECTION

SECTION 03 39 00

CONCRETE CURING

Polyethylene Film and
Sheeting.

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes initial and final curing of horizontal and vertical concrete surfaces.
- B. Related Sections:
 - 1. Section 033000 - Cast-In-Place Concrete.
 - 2. Section 033500 - Concrete Finishing.

1.2 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 301 - Specifications for Structural Concrete.
 - 2. ACI 302.1 - Guide for Concrete Floor and Slab Construction.
 - 3. ACI 308.1 - Standard Specification for Curing Concrete.
 - 4. ACI 318 - Building Code Requirements for Structural Concrete.
- B. ASTM International:
 - 1. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.
 - 2. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - 3. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
 - 4. ASTM D2103 - Standard Specification for

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on curing compounds, mats, paper, film, compatibilities, and limitations.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Membrane Curing Compound Type 1.
- B. Membrane Curing Compound: ASTM C1315 Type I.
- C. Water: Potable, not detrimental to concrete.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 013000 - Administrative Requirements: Coordination and project conditions.
- B. Verify substrate surfaces are ready to be cured.

3.2 INSTALLATION - HORIZONTAL SURFACES

- A. Cure concrete in accordance with ACI 308.1.

- B. Ponding: Maintain 100 percent coverage of water over floor slab areas, continuously for 4 days.

***** [OR] *****

- C. Spraying: Spray water over floor slab areas and maintain wet for 7 days.

***** [OR] *****

- D. Absorptive Mat: Spread cotton fabric over floor slab areas. Spray with water until mats are saturated, and maintain in saturated condition for 7 days.

***** [OR] *****

- E. Absorptive Mat: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place for 7 days.

- D. Other Floor Areas: Membrane curing compound, acrylic type, translucent color.

END OF SECTION

3.3 PROTECTION OF FINISHED WORK

- A. Section 017000 - Execution Requirements: Protecting finished Work.
- B. Do not permit traffic over unprotected floor surface.

3.4 SCHEDULES

- A. Storage Area Slabs: Absorptive mats, burlap-polyethylene type.
- B. Retaining Walls: Membrane curing compound, acrylic type, clear color.
- C. Concrete Pavement: Membrane curing compound, opaque color.

SECTION 03 60 00

GROUT

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Portland cement grout.
 2. Rapid curing epoxy grout.
 3. Non-shrink cementitious grout.
- B. Related Sections:
1. Section 033000 - Cast-in-Place Concrete.

1.2 REFERENCES

- A. American Concrete Institute:
1. ACI 301 - Specifications for Structural Concrete.
 2. ACI 318 - Building Code Requirements for Structural Concrete.
- B. American Society of Testing and Materials:
1. ASTM C33 - Standard Specification for Concrete Aggregates.
 2. ASTM C40 - Test Method for Organic Impurities in Fine Aggregates for Concrete.
 3. ASTM C150 - Standard Specification for Portland Cement.
 4. ASTM C191 - Test Method for Time of Setting of Hydraulic Cement by Vicat Needle.
 5. ASTM C307 - Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacing.
 6. ASTM C531 - Test Method for Linear

- Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
7. ASTM C579 - Test Method for Compressive Strength of Chemical-Resistant Mortars, Grouts, monolithic Surfacing and Polymer Concretes.
 8. ASTM C827 - Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.
- C. U. S. Army Corps of Engineers Concrete Research Division (CRD):
1. CRD C621 - Non-Shrink Grout.

PART 2 PRODUCTS

2.1 PORTLAND CEMENT GROUT MATERIALS

- A. Portland Cement: ASTM C150, Type I and II.
- B. Water:
1. Potable; containing no impurities, suspended particles, algae or dissolved natural salts in quantities capable of causing:
 - a. Corrosion of steel.
 - b. Volume change increasing shrinkage cracking.
 - c. Efflorescence.
 - d. Excess air entraining.

- C. Fine Aggregate:
1. Washed natural sand.
 2. Gradation in accordance with ASTM C33 and represented by smooth granulometric curve within required limits.
 3. Free from injurious amounts of organic impurities as determined by ASTM C40.
- D. Mix:
1. Portland cement, sand and water. Do not use ferrous aggregate or staining ingredients in grout mixes.

2.2 RAPID CURING EPOXY GROUT

- A. Rapid Curing Epoxy Grout: High strength, three component epoxy grout formulated with thermosetting resins and inert fillers. Rapid-curing, high adhesion, and resistant to ordinary chemicals, acids and alkalis.

Compressive Strength	ASTM C579	12,000 psi at 7 days
Tensile Strength	ASTM C307	2,000 psi minimum
Coefficient of Expansion	ASTM C531	30x10 ⁻⁶ in per degree F
Shrinkage	ASTM C827	None

2.3 NON-SHRINK CEMENTITIOUS GROUT

- A. Properties: Certified to maintain initial placement volume or expand after set and meet the following minimum properties when tested in accordance with CRD-C621, for Type D non-shrink grout:

Property	Test	Time	Result
Setting Time	ASTM C191	Initial	2 hours (Approx)

		Final	3 hours (Approx)
Expansion			0.10% - 0.4% Maximum
Compressive Strength	CRD-C621	1 day	4,000 psi
		7 days	7,000 psi
		28 days	10,000 psi to 10,800 psi

2.4 FORMWORK

- A. Refer to Section 031000 for formwork requirements.

2.5 CURING

- A. Prevent rapid loss of water from grout during first 48 hours by use of approved membrane curing compound or with use of wet burlap method.

PART 3 EXECUTION

3.1 PREPARATION

- A. Remove defective concrete, laitance, dirt, oil, grease and other foreign material from concrete surfaces by brushing, hammering, chipping or other similar means until sound, clean concrete surface is achieved.
- B. Rough concrete lightly, but not enough to interfere with placement of grout.
- C. Remove foreign materials from metal surfaces in contact with grout.
- D. Align, level and maintain final positioning of components to be grouted.
- E. Saturate concrete surfaces with clean water; remove excess water, leave none standing.

3.2 MIXING

- A. Portland Cement Grout:
1. Use proportions of 2 parts sand and 1 part cement, measured by volume.
 2. Prepare grout with water to obtain consistency to permit placing and packing.
 3. Mix water and grout in two steps; pre-mix using approximately 2/3 of water; after partial mixing, add remaining water to bring mix to desired placement consistency and continue mixing 2 to 3 minutes.
 4. Mix only quantities of grout capable of being placed within 30 minutes after mixing.
 5. Do not add additional water after grout has been mixed.
 6. Capable of developing minimum compressive strength of 2400 psi in 48 hours and 7000 psi in 28 days.

***** [OR] *****

3.3 PLACING GROUT

- A. Place grout material quickly and continuously.
- B. Do not use pneumatic-pressure or dry-packing methods.
- C. Apply grout from one side only to avoid entrapping air.
- D. Do not vibrate placed grout mixture, or permit placement when area is being vibrated by nearby equipment.

- E. Thoroughly compact final installation and eliminate air pockets.
- F. Do not remove leveling shims for at least 48 hours after grout has been placed.

3.4 CURING

- A. Immediately after placement, protect grout from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. After grout has attained its initial set, keep damp for minimum of 3 days.

3.5 FIELD QUALITY CONTROL

- A. Submit proposed mix design of each class of grout to inspection and testing firm for review prior to commencement of Work.
- B. Tests of grout components may be performed to ensure conformance with specified requirements.

END OF SECTION

DIVISION 4

MASONRY

THE AGREEMENT, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, SUPPLEMENTARY CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, AND ALL ADDENDA ARE A PART OF THE CONTRACT. THE CONTRACTOR SHALL CONSULT THEM IN DETAIL FOR INSTRUCTIONS PERTAINING TO THE WORK. THE CONTRACTOR SHALL ALSO CONSULT ALL OTHER DIVISIONS AND SECTIONS OF THE PROJECT MANUAL, AND ALL DRAWINGS IN THE EXECUTION OF THE WORK OF THE CONTRACT.

THE CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, SYSTEMS, EQUIPMENT, ITEMS, ARTICLES, OPERATIONS, AND/OR METHODS LISTED, IMPLIED, MENTIONED, OR SCHEDULED IN THE CONTRACT DOCUMENTS AND/OR NECESSARY AND/OR REQUIRED FOR THE SATISFACTORY COMPLETION OF THE WORK.

THE LISTING OF WORK, REQUIREMENTS, AND PRODUCTS IN THIS SECTION IS NOT INTENDED TO BE CONCLUSIVE. THE CONTRACTOR SHALL CHECK ALL OTHER PARTS OF THE CONTRACT DOCUMENTS AND SHALL PROVIDE ALL MISCELLANEOUS ITEMS OF WORK AND PRODUCTS NECESSARY FOR THE SATISFACTORY COMPLETION OF THE WORK DESCRIBED IN THE CONTRACT DOCUMENTS.

SECTION 04 05 14

MASONRY MORTAR AND GROUT

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes mortar and grout for masonry.
- B. Related Sections:
 - 1. Section 042000 - Unit Masonry Assemblies: Installation of mortar and grout.
 - 2. Section 042016 - Reinforced Unit Masonry Assemblies: Installation of mortar and grout.

1.2 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 530 - Building Code Requirements for Masonry Structures.
 - 2. ACI 530.1 - Specifications for Masonry Structures.
- B. ASTM International:
 - 1. ASTM C5 - Standard Specification for Quicklime for Structural Purposes.
 - 2. ASTM C91 - Standard Specification for Masonry Cement.
 - 3. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
 - 4. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
 - 5. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.

- 6. ASTM C150 - Standard Specification for Portland Cement.
- 7. ASTM C199 - Standard Test Method for Pier Test for Refractory Mortars.
- 8. ASTM C206 - Standard Specification for Finishing Hydrated Lime.
- 9. ASTM C270 - Standard Specification for Mortar for Unit Masonry.
- 10. ASTM C387 - Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete.
- 11. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.
- 12. ASTM C476 - Standard Specification for Grout for Masonry.
- 13. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
- 14. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
- 15. ASTM C1019 - Standard Test Method for Sampling and Testing Grout.
- 16. ASTM C1142 - Standard Specification for Extended Life Mortar for Unit Masonry.
- 17. ASTM C1314 - Standard Test Method for Constructing and Testing Masonry Prisms Used to Determine Compliance with Specified Compressive Strength of Masonry.

- 18. ASTM C1329 - Standard Specification for Mortar Cement.
- 19. ASTM C1357 - Standard Test Method for Evaluating Masonry Bond Strength.

1.3 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Submittal requirements.
- B. Design Data: Submit design mix when Property specification of ASTM C270 is to be used, required environmental conditions, and admixture limitations.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 530 and ACI 530.1.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Section 016000 - Product Requirements.
- B. Cold Weather Requirements: In accordance with ACI 530.1 when ambient temperature or temperature of masonry units is less than 40 degrees F.
- C. Hot Weather Requirements: In accordance with ACI 530.1 when ambient temperature is greater than 100 degrees F or ambient temperature is greater than 90 degrees F with wind velocity greater than 8 mph.

PART 2 PRODUCTS**2.1 COMPONENTS**

- A. Portland Cement: ASTM C150, Type I

- B. Calcium chloride is not permitted.

2.2 MIXES

- A. Mortar Mixes:
 - 1. Extended Life Mortar: ASTM C1142, Type RS
- B. Mortar Mixing:
 - 1. Thoroughly mix mortar ingredients in accordance with ASTM C270 in quantities needed for immediate use.
 - 2. Achieve uniformly damp sand immediately before mixing process.
 - 3. Re-temper only within two hours of mixing.
- C. Grout Mixes:
 - 1. Grout for Non-Structural Masonry: 3,000 psi strength at 28 days; 8-11 inches slump; mixed in accordance with ASTM C476 grout.
 - 2. Grout for Structural Masonry: 3,000 psi strength at 28 days; 8-11 inches slump; mixed in accordance with ASTM C476 grout.
 - 3. Application:
 - a. Coarse Grout: For grouting spaces with minimum 4 inches dimension in every direction.
 - b. Fine Grout: For grouting other spaces.
- D. Grout Mixing:
 - 1. Mix grout in accordance with ASTM C94/C94M, modified to use ingredients complying with ASTM C476.

2. Add admixtures; mix uniformly.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 013000 - Administrative Requirements: Coordination and project conditions.
- B. Request inspection of spaces to be grouted.

3.2 INSTALLATION

- A. Install mortar and grout in accordance with ACI 530.1 Specifications for Masonry Structures.

3.3 FIELD QUALITY CONTROL

- A. Establishing Mortar Mix: In accordance with ASTM C270.
- B. Testing Frequency: One set of specified tests for every 5,000 sf of completed wall area.
- C. Testing of Mortar Mix: In accordance with ASTM C780 for aggregate ratio and water content, air content, consistency, and compressive strength.
- D. Testing of Grout Mix: In accordance with ASTM C1019 for compressive strength, and in accordance with ASTM C143/C143M for slump.
- E. Test compressive strength of mortar and masonry to ASTM C1314; test in accordance with masonry unit sections specified.

END OF SECTION

SECTION 04 20 16

REINFORCED UNIT MASONRY ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes concrete masonry units, reinforcement, anchorage, and accessories.
- B. Related Sections:
 - 1. Section 040514 - Masonry Mortar and Grout: Mortar and grout.

1.2 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 530 - Building Code Requirements for Masonry Structures.
 - 2. ACI 530.1 - Specifications for Masonry Structures.
- B. ASTM International:
 - 1. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 2. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - 3. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
 - 4. ASTM A580/A580M - Standard Specification for Stainless Steel Wire.
 - 5. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for

- Concrete Reinforcement.
- 6. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- 7. ASTM A951 - Standard Specification for Masonry Joint Reinforcement.
- 8. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction.
- 9. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
- 10. ASTM C27 - Standard Classification of Fireclay and High-Alumina Refractory Brick.
- 11. ASTM C34 - Standard Specification for Structural Clay Load-Bearing Wall Tile.
- 12. ASTM C55 - Standard Specification for Concrete Brick.
- 13. ASTM C56 - Standard Specification for Structural Clay Non-Load-Bearing Tile.
- 14. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale).
- 15. ASTM C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
- 16. ASTM C73 - Standard Specification for Calcium Silicate Face Brick (Sand-Lime Brick).

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| <p>17. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units.</p> <p>18. ASTM C126 - Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units.</p> <p>19. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units.</p> <p>20. ASTM C140 - Standard Test Methods of Sampling and Testing Concrete Masonry Units.</p> <p>21. ASTM C212 - Standard Specification for Structural Clay Facing Tile.</p> <p>22. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale).</p> <p>23. ASTM C315 - Standard Specification for Clay Flue Linings.</p> <p>24. ASTM C530 - Standard Specification for Structural Clay Non-Loadbearing Screen Tile.</p> <p>25. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.</p> <p>26. ASTM C652 - Standard Specification for Hollow Brick (Hollow Masonry Units Made From Clay or Shale).</p> <p>27. ASTM C744 - Standard Specification for Prefaced Concrete and Calcium Silicate Masonry Units.</p> <p>28. ASTM C1261 - Standard Specification for Firebox Brick for Residential Fireplaces.</p> <p>29. ASTM C1283 - Standard Practice for Installing Clay Flue Lining.</p> | <p>30. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.</p> <p>31. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.</p> <p>32. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.</p> <p>C. National Fire Protection Association:</p> <p>1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.</p> <p>D. Underwriters Laboratories Inc.:</p> <p>1. UL 723 - Tests for Surface Burning Characteristics of Building Materials.</p> <p>1.3 PERFORMANCE REQUIREMENTS</p> <p>A. Concrete Masonry Compressive Strength</p> <p>1. Concrete Masonry Units: 1900 psi minimum net area compressive strength.</p> <p>1.4 SUBMITTALS</p> <p>A. Section 013300 - Submittal Procedures: Submittal requirements.</p> <p>B. Shop Drawings: Indicate bars sizes, spacings, locations, reinforcement quantities, bending and cutting schedules, supporting and spacing devices for reinforcement.</p> <p>C. Product Data:</p> |
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1. Submit data for masonry units and fabricated wire reinforcement.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 530 and ACI 530.1.

1.6 QUALIFICATIONS

- A. Installer: Company specializing in performing Work of this section with minimum three years experience.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Section 016000 - Product Requirements.
- B. Cold Weather Requirements: In accordance with ACI 530.1 when ambient temperature or temperature of masonry units is less than 40 degrees F.
- C. Hot Weather Requirements: In accordance with ACI 530.1 when ambient temperature is greater than 100 degrees F or ambient temperature is greater than 90 degrees F with wind velocity greater than 8 mph.

PART 2 PRODUCTS

2.1 COMPONENTS

- A. Hollow Load Bearing Concrete Masonry Units (CMU): ASTM C90; normal weight.

2.2 ACCESSORIES

- A. Single Wythe Joint Reinforcement: ASTM A951; ladder type; 0.148 inch diameter side rods with 0.148 inch diameter cross ties.

- B. Reinforcing Steel: ASTM A615/A615M, 60 ksi yield grade, deformed billet bars.

- C. Anchor Rods: ASTM A307; Grade C; J-shaped or L-shaped; complete with washers and heavy hex nuts; sized for minimum 15 inch embedment.

1. Hot-Dipped Galvanizing: ASTM A153/A153M.
2. Mechanical Galvanizing: ASTM B695; Class 55.

- D. Mortar and Grout: As specified in Section 04065.

- E. Joint Filler: Closed cell rubber; oversized 50 percent to joint width; self expanding.

2.3 SOURCE QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Testing, inspection and analysis requirements.
- B. Test brick efflorescence in accordance with ASTM C67. Brick rated greater than "slightly effloresced" is not acceptable.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 013000 - Administrative Requirements: Coordination and project conditions.
- B. Verify field conditions are acceptable and are ready to receive work.
- C. Verify items provided by other sections of work are properly sized and located.
- D. Verify built-in items are in proper location, and ready for roughing into masonry work.

3.2 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied to other Sections.
- B. Furnish temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent support.
- C. Wet clay and shale brick before laying when initial rate of absorption is greater than 30 grams when tested in accordance with ASTM C67.

3.3 INSTALLATION

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form bed and head joints of uniform thickness.
- C. Coursing of Concrete Masonry Units:
 1. Bond: Running.
 2. Coursing: One unit and one mortar joint to equal 8 inches.
 3. Mortar Joints: Concave.
- D. Placing And Bonding:
 1. Lay solid masonry units in full bed of mortar, with full head joints.
 2. Lay hollow masonry units with face shell bedding on head and bed joints.
 3. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
 4. Remove excess mortar as Work progresses.
 5. Interlock intersections and external corners.
 6. Do not shift or tap masonry units after

mortar has achieved initial set. Where adjustment is required, remove mortar and replace.

7. Perform job site cutting of masonry units with proper tools to assure straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
8. Isolate masonry from vertical structural framing members with movement joint .
9. Isolate top of masonry from horizontal structural framing members and slabs or decks.

E. Joint Reinforcement And Anchorage:

1. Install horizontal joint reinforcement 16 inches oc.
2. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
3. Place joint reinforcement continuous in first and second joint below top of walls.
4. Lap joint reinforcement ends minimum 6 inches.
5. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
6. Embed anchors embedded in concrete attached to structural steel members. Embed anchorages in every sixth brick.

F. Lintels:

1. Install precast concrete lintels over openings.

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| <ol style="list-style-type: none"> 2. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled or indicated. 3. Openings Up To 42 inches Wide: Reinforce openings as indicated on Drawings. 4. Openings From 42 inches Up To 78 inches Wide: Reinforce openings as indicated on Drawings. 5. Openings Over 78 inches: Reinforce openings as indicated on Drawings. 6. Do not splice reinforcing bars. 7. Support and secure reinforcing bars from displacement. 8. Place and consolidate grout fill without displacing reinforcing. 9. Allow masonry lintels to attain specified strength before removing temporary supports. 10. Maintain minimum 8 inches bearing on each side of opening. <p>G. Grouted Components:</p> <ol style="list-style-type: none"> 1. Reinforce bond beam with 1, No. 5 bar. 2. Reinforce pilaster with 1, No. 6 bar in each cell. 3. Lap splices bar diameters required by code. 4. Support and secure reinforcing bars from displacement. 5. Place and consolidate grout fill without displacing reinforcing. 6. At bearing locations, fill masonry cores with grout for minimum 12 inches either side of opening. | <p>H. Reinforced Masonry:</p> <ol style="list-style-type: none"> 1. Lay masonry units with cells vertically aligned and cavities between wythes clear of mortar and unobstructed. 2. Place reinforcing, reinforcement bars, and grout as indicated on Drawings. 3. Splice reinforcement in accordance with Section 03200. 4. Support and secure reinforcement from displacement. 5. Place and consolidate grout fill without displacing reinforcing. 6. Place grout in accordance with ACI 530.1 Specification for Masonry Structures. <p>I. Control And Expansion Joints:</p> <ol style="list-style-type: none"> 1. Install control and expansion joints at the following maximum spacings, unless otherwise indicated on Drawings: <ol style="list-style-type: none"> a. Exterior Walls: 20 feet on center and within 10 feet on one side of each interior and exterior corner. b. Interior Walls: 30 feet on center. c. At changes in wall height. 2. Do not continue horizontal joint reinforcement through control and expansion joints. 3. Install preformed control joint device in continuous lengths. Seal butt and corner joints. 4. Size control joint in accordance with Section 07900 for sealant performance. |
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<div> <div>5.</div> <div>Form expansion joint by omitting mortar and cutting unit to form open space.</div> </div> <div> <div>J.</div> <div>Cutting And Fitting:</div> <div> <div>1.</div> <div>Obtain Architect/Engineer's approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.</div> </div> </div>	<div> <div>centerline of steel to opposite face of masonry is 8 inches or less.</div> <div> <div>3.</div> <div>Plus or minus 1 inch when distance is between 8 and 24 inches.</div> </div> <div> <div>4.</div> <div>Plus or minus 1-1/4 inch when distance is greater than 24 inches.</div> </div> <div> <div>5.</div> <div>Plus or minus 2 inches from location along face of wall.</div> </div> </div>
<div> <div>3.4</div> <div>ERECTION TOLERANCES</div> <div> <div>A.</div> <div>Section 014000 - Quality Requirements: Tolerances.</div> </div> <div> <div>B.</div> <div>Maximum Variation From Alignment of Pilasters: 1/4 inch.</div> </div> <div> <div>C.</div> <div>Maximum Variation From Unit to Adjacent Unit: 1/16 inch.</div> </div> <div> <div>D.</div> <div>Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.</div> </div> <div> <div>E.</div> <div>Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.</div> </div> <div> <div>F.</div> <div>Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.</div> </div> <div> <div>G.</div> <div>Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.</div> </div> <div> <div>H.</div> <div>Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.</div> </div> <div> <div>I.</div> <div>Maximum Variation for Steel Reinforcement:</div> <div> <div>1.</div> <div>Install reinforcement within the tolerances specified in ACI 530.1 for foundation walls.</div> </div> <div> <div>2.</div> <div>Plus or minus 1/2 inch when distance from</div> </div> </div> </div>	<div> <div>3.5</div> <div>FIELD QUALITY CONTROL</div> <div> <div>A.</div> <div>Concrete Masonry Units: Test each type in accordance with ASTM C140.</div> </div> </div> <div> <div>3.6</div> <div>CLEANING</div> <div> <div>A.</div> <div>Section 017000 - Execution Requirements: Final cleaning.</div> </div> <div> <div>B.</div> <div>Remove excess mortar and mortar smears as work progresses.</div> </div> <div> <div>C.</div> <div>Replace defective mortar. Match adjacent work.</div> </div> <div> <div>D.</div> <div>Clean soiled surfaces with cleaning solution.</div> </div> <div> <div>E.</div> <div>Use non-metallic tools in cleaning operations.</div> </div> </div> <div> <div>3.7</div> <div>PROTECTION OF FINISHED WORK</div> <div> <div>A.</div> <div>Section 017000 - Execution Requirements: Requirements for protecting finished Work.</div> </div> <div> <div>B.</div> <div>Protect exposed external corners subject to damage.</div> </div> <div> <div>C.</div> <div>Protect base of walls from mud and mortar splatter.</div> </div> <div> <div>D.</div> <div>Protect masonry and other items built into masonry walls from</div> </div> </div>

mortar droppings and staining caused by mortar.

- E. Protect tops of masonry work with waterproof coverings secured in place without damaging masonry. Provide coverings where masonry is exposed to weather when work is not in progress.

END OF SECTION

DIVISION 5

METALS

THE AGREEMENT, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, SUPPLEMENTARY CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, AND ALL ADDENDA ARE A PART OF THE CONTRACT. THE CONTRACTOR SHALL CONSULT THEM IN DETAIL FOR INSTRUCTIONS PERTAINING TO THE WORK. THE CONTRACTOR SHALL ALSO CONSULT ALL OTHER DIVISIONS AND SECTIONS OF THE PROJECT MANUAL, AND ALL DRAWINGS IN THE EXECUTION OF THE WORK OF THE CONTRACT.

THE CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, SYSTEMS, EQUIPMENT, ITEMS, ARTICLES, OPERATIONS, AND/OR METHODS LISTED, IMPLIED, MENTIONED, OR SCHEDULED IN THE CONTRACT DOCUMENTS AND/OR NECESSARY AND/OR REQUIRED FOR THE SATISFACTORY COMPLETION OF THE WORK.

THE LISTING OF WORK, REQUIREMENTS, AND PRODUCTS IN THIS SECTION IS NOT INTENDED TO BE CONCLUSIVE. THE CONTRACTOR SHALL CHECK ALL OTHER PARTS OF THE CONTRACT DOCUMENTS AND SHALL PROVIDE ALL MISCELLANEOUS ITEMS OF WORK AND PRODUCTS NECESSARY FOR THE SATISFACTORY COMPLETION OF THE WORK DESCRIBED IN THE CONTRACT DOCUMENTS.

SECTION 05 12 00

STRUCTURAL STEEL

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Structural shapes.
 2. Channels and angles.
 3. Hollow structural sections.
 4. Structural pipe.
 5. Structural plates and bars.
 6. Fasteners, connectors, and anchors.
 7. Fasteners, connectors, and anchors.
 8. Grout.
- B. Related Sections:
1. Section 036000 - Grout: Grout for setting base plates.
 2. Section 052100 - Steel Joists.
 3. Section 053123 - Steel Roof Deck
 4. Section 055000 - Metal Fabrications: Steel Fabrications affecting structural steel work.

1.2 REFERENCES

- A. American Institute of Steel Construction:
1. AISC Code of Standard Practice for Steel Buildings and Bridges.
 2. AISC Load and Resistance Factor Design (LRFD) Specification for Structural Steel Buildings.
 3. AISC Load and Resistance Factor Design Specification for Single-Angle Members.

4. AISC Seismic Provisions for Structural Steel Buildings.
 5. AISC Specification for Allowable Stress Design of Single-Angle Members.
 6. AISC Specification for the Design of Steel Hollow Structural Sections.
 7. AISC Specification for Structural Steel Buildings Allowable Stress Design, and Plastic Design.
- B. ASTM International:
1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
 2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 3. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
 4. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 5. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 6. ASTM A193/A193M - Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
 7. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.

8.	ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.			Vanadium Structural Steel.
9.	ASTM A354 - Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners.		18.	ASTM A588/A588M - Standard Specification for High-Strength Low-Alloy Structural Steel with 50 ksi (345 MPa) Minimum Yield Point to 4-in. (100-mm) Thick.
10.	ASTM A449 - Standard Specification for Quenched and Tempered Steel Bolts and Studs.		19.	ASTM A618 - Standard Specification for Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing.
11.	ASTM A490 - Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.		20.	ASTM A786/A786M - Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.
12.	ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.		21.	ASTM A847 - Standard Specification for Cold-Formed Welded and Seamless High Strength, Low Alloy Structural Tubing with Improved Atmospheric Corrosion Resistance.
13.	ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.		22.	ASTM A852/A852M - Standard Specification for Quenched and Tempered Low-Alloy Structural Steel Plate with 70 ksi (485 MPa) Minimum Yield Strength to 4 in. (100 mm) Thick.
14.	ASTM A514/A514M - Standard Specification for High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding.		23.	ASTM A913/A913M - Standard Specification for High-Strength Low-Alloy Steel Shapes of Structural Quality, Produced by Quenching and Self-Tempering Process (QST).
15.	ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality.		24.	ASTM A992/A992M - Standard Specification for Structural Steel Shapes.
16.	ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.		25.	ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
17.	ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-			

- 26. ASTM E94 - Standard Guide for Radiographic Examination.
 - 27. ASTM E164 - Standard Practice for Ultrasonic Contact Examination of Weldments.
 - 28. ASTM E165 - Standard Test Method for Liquid Penetrant Examination.
 - 29. ASTM E709 - Standard Guide for Magnetic Particle Examination.
 - 30. ASTM F436 - Standard Specification for Hardened Steel Washers.
 - 31. ASTM F959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.
 - 32. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
 - 33. ASTM F1852 - Standard Specification for Twist Off Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- C. American Welding Society:
- 1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
 - 2. AWS D1.1 - Structural Welding Code - Steel.
- D. Research Council on Structural Connections:
- 1. RCSC - Specification for Structural Joints Using ASTM A325 or A490 Bolts.
- E. SSPC: The Society for Protective Coatings:

- 1. SSPC - Steel Structures Painting Manual.
- 2. SSPC Paint 15 - Steel Joist Shop Paint.
- 3. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).
- 4. SSPC SP 3 - Power Tool Cleaning.
- 5. SSPC SP 6 - Commercial Blast Cleaning.
- 6. SSPC SP 10 - Near-White Blast Cleaning.

1.3 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings:
 - 1. Indicate profiles, sizes, spacing, and locations of structural members, openings, attachments, and fasteners.
 - 2. Connections.
 - 3. Cambers
 - 4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.
- C. Mill Test Reports: Submit indicating structural strength and destructive and non-destructive test analysis.
- D. Manufacturer's Mill Certificate: Certify products meet or exceed specified requirements.
- E. Welders Certificates: Certify welders employed on the Work, verifying AWS qualifications within previous 12 months.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with the following:

<ol style="list-style-type: none"> 1. AISC Code of Standard Practice for Steel Buildings and Bridges. 2. AISC Code of Standard Practice for Steel Buildings and Bridges. Section 10. 3. AISC Seismic Provisions for Structural Steel Buildings. 4. AISC Specification for Structural Steel Buildings Allowable Stress Design, and Plastic Design. 5. AISC Load and Resistance Factor Design (LRFD) Specification for Structural Steel Buildings. 6. AISC Specification for the Design of Steel Hollow Structural Sections. 7. AISC Specification for Allowable Stress Design of Single-Angle Members. 8. AISC Load and Resistance Factor Design Specification for Single-Angle Members. 9. RCSC Specification for Structural Joints Using ASTM A 325 or A 490 Bolts. 10. ASCE 19. 		<ol style="list-style-type: none"> B. Structural M-Shapes: ASTM A36/A36M; Grade 50 C. Structural T-Shapes: Cut from structural W-shapes. D. Channels and Angles: ASTM A36/A36M. E. Round Hollow Structural Sections: ASTM A500, Grade B. F. Square and Rectangular Hollow Structural Sections: ASTM A500, Grade B. G. Structural Plates and Bars: ASTM A36/A36M.
<p>1.5 COORDINATION</p> <p>A. Section {013000 - Administrative Requirements}: Requirements for coordination.</p>		<p>2.2 FASTENERS, CONNECTORS, AND ANCHORS</p> <ol style="list-style-type: none"> A. Bolts: ASTM A307; Grade A or B. <ol style="list-style-type: none"> 1. Finish: Unfinished B. High Strength Bolts: ASTM A325; Type 1 or ASTM A490; Type 1. <ol style="list-style-type: none"> 1. Finish: Unfinished C. Nuts: ASTM A563 heavy hex type. <ol style="list-style-type: none"> 1. Finish: Unfinished D. Washers: ASTM F436; Type 1, circular <ol style="list-style-type: none"> 1. Finish: Unfinished E. Threaded Rods: ASTM A36/A36M; Grade A. <ol style="list-style-type: none"> 1. Finish: Unfinished F. Forged Structural Steel Hardware: <ol style="list-style-type: none"> 1. Clevises and Turnbuckles: ASTM A108; Grade 1085. 2. Eye Nuts and Eye Bolts: ASTM A108; Grade 1030. 3. Sleeve Nuts: ASTM A108; Grade 1018. 4. Rod Ends, Yoke Ends and Pins, Cotter Pins, and Coupling Nuts: Carbon steel.
<p>PART 2 PRODUCTS</p> <p>2.1 STRUCTURAL STEEL</p> <p>A. Structural W-Shapes: ASTM A992/A992M; Grade 50</p>		

2.3 WELDING MATERIALS

- A. Welding Materials: AWS D1.1; type required for materials being welded.

2.4 ACCESSORIES

- A. Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing minimum compressive strength of 7,000 psi at 28 days
- B. Shop and Touch-Up Primer: SSPC Paint 15, Type 1, red oxide.

2.5 FABRICATION

- A. Continuously seal joined members by continuous welds. Grind exposed welds smooth.
- B. Fabricate connections for bolt, nut, and washer connectors.
- C. Develop required camber for members.

2.6 FINISH

- A. Prepare structural component surfaces in accordance with SSPC SP 3.
- B. Shop prime structural steel members.
- C. Galvanizing for Structural Steel Members: ASTM A123/A123M; minimum 1.2 oz/sq ft coating thickness; galvanize after fabrication.
- D. Galvanizing for Fasteners, Connectors, and Anchors:
 - 1. Hot-Dipped Galvanizing: ASTM A153/A153M.

- 2. Mechanical Galvanizing: ASTM B695; Class 50 minimum.

2.7 SOURCE QUALITY CONTROL AND TESTS

- A. Section 014000 - Quality Requirements: Testing, inspection and analysis requirements.
- B. Shop test bolted and welded connections as specified for field quality control tests.
- C. When fabricator is approved by authority having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
 - 1. Specified shop tests are not required for Work performed by approved fabricator.

PART 3 EXECUTION**3.1 EXAMINATION**

- A. Section 013000 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify bearing surfaces are at correct elevation.
- C. Verify anchors rods are set in correct locations and arrangements with correct exposure for steel attachment.

3.2 PREPARATION

- A. Furnish templates for installation of anchor rods and embedments in concrete and masonry work.

3.3 ERECTION

- A. Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in alignment until completion of erection and installation of permanent bracing.
- B. Field weld components and shear connectors indicated on Drawings.
- C. Field connect members with threaded fasteners; tighten to snug tight for bearing type connections.
- D. Do not field cut or alter structural members without approval of Architect/Engineer.
- E. After erection, touch up welds and abrasions to match shop finishes.

3.4 GROUT INSTALLATION

- A. Grout [under base plates in accordance with Section 036000.
- B. Shim bearing plates and equipment supports to proper elevation, snug tighten anchor bolts.
- C. Fill void under bearing surface with grout. Install and pack grout to remove air pockets.
- D. Moist cure grout.
- E. Remove forms after grout is set. Trim grout edges to form smooth surface, splayed 45 degrees.
- F. Tighten anchor bolts after grout has cured for a minimum of 3 days.

3.5 ERECTION TOLERANCES

- A. Section 014000 - Quality Requirements: Tolerances.
- B. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- C. Maximum Offset From Alignment: 1/4 inch.

3.6 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Bolted Connections: Inspect in accordance with AISC specifications.
 - 1. Visually inspect all bolted connections.
 - 2. For Direct Tension Indicators, comply with requirements of ASTM F959. Verify that gaps are less than gaps specified in Table 2.
- C. Welding: Inspect welds in accordance with AWS D1.1.
 - 1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
 - 2. Visually inspect all welds.
 - 3. Ultrasonic Inspection: ASTM E164; perform on all full penetration welds.
 - 4. Liquid Penetrant Inspection: ASTM E165.
- D. Correct defective bolted connections and welds.

END OF SECTION

SECTION 05 40 00

COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes load bearing formed steel stud exterior wall, interior wall; and formed steel purlin, framing and bridging.
- B. Related Sections:
1. Section 053110 - Steel Floor Deck: Metal floor decking supported by wall stud metal framing.
 2. Section 053123 - Steel Roof Deck: Metal roof decking supported by wall stud metal framing.
 3. Section 061000 - Framing and Sheathing.
 4. Section 092216 - Non-Load-Bearing Metal Framing System.

1.2 REFERENCES

- A. American Iron and Steel Institute:
1. AISI General - Standard for Cold-Formed Steel Framing - General Provisions.
 2. AISI Header - Standard for Cold-Formed Steel Framing - Header Design.
 3. AISI NASPEC - North American Specification for Design of Cold-Formed Steel Structural Members.
 4. AISI - Residential Steel Framing Manual.
- B. ASTM International:
1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or

- Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
2. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
 3. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
 4. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
 5. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
 6. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
 7. ASTM C955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases.

C. American Welding Society:

<ul style="list-style-type: none"> 1. AWS D1.1 - Structural Welding Code - Steel. 2. AWS D1.3 - Structural Welding Code - Sheet Steel. <p>D. National Association of Architectural Metal Manufacturers:</p> <ul style="list-style-type: none"> 1. NAAMM ML/SFA 540 - Lightweight Steel Framing Systems Manual. <p>E. SSPC: The Society for Protective Coatings:</p> <ul style="list-style-type: none"> 1. SSPC Paint 15 - Steel Joist Shop Paint. 2. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic). <p>F. Steel Stud Manufacturers Association:</p> <ul style="list-style-type: none"> 1. SSMA - Product Technical Information. 	<ul style="list-style-type: none"> 3. Design system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.
<p>1.3 SYSTEM DESCRIPTION</p> <p>A. Size components to withstand design loads as follows:</p> <ul style="list-style-type: none"> 1. Vertical Assembly: 25 psf positive and 30 psf negative. 2. Horizontal Assembly: 20 psf live loads. <p>B. Maximum Allowable Deflection:</p> <p>1: 360 of span.</p> <p>C. Wall System:</p> <ul style="list-style-type: none"> 1. Design to AISI NASPEC, AISC General, and AISC Header. 2. Design to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to 	<p>1.4 PERFORMANCE REQUIREMENTS</p> <p>A. Select stud thickness to resist minimum 5 psf uniform load and maximum 1/360 deflection.</p> <p>1.5 SUBMITTALS</p> <p>A. Section 013300 - Submittal Procedures: Submittal requirements.</p> <p>B. Shop Drawings:</p> <ul style="list-style-type: none"> 1. Indicate component details, framed openings, bearing, anchorage, loading, welds, type and location of fasteners, and accessories or items required of related Work. 2. Indicate stud, floor joist, ceiling joist, roof joist, roof rafter, roof truss, and layout. 3. Submit calculations for loadings and stresses of specially fabricated framing, and roof trusses, under Professional engineer's seal. <p>C. Product Data: Submit data on standard framing members; describe materials and finish, product criteria, and limitations.</p> <p>D. Manufacturer's Installation Instructions: Submit special</p>

procedures and perimeter conditions requiring special attention.

1.6 QUALITY ASSURANCE

- A. Calculate structural properties of framing members in accordance with AISI NASPEC.
- B. Furnish framing materials in accordance with SSMA - Product Technical Information.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
 - 1. Current member of Steel Stud Manufacturers Association.
- B. Installer: Company specializing in performing Work of this section with minimum 3 years documented experience or as approved by manufacturer.
- C. Design structural elements under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Texas.

1.8 COORDINATION

- A. Section 013000 - Administrative Requirements: Coordination and project conditions.

PART 2 PRODUCTS

2.1 COLD-FORMED METAL FRAMING

- A. Manufacturers:
 - 1. Clark Steel Framing Systems

- 2. Harrison Manufacturing Co.
- 3. Marino\Ware
- 4. Unimast Incorporated
- 5. Dietrich Metal Framing
- 6. Substitutions: Section 016000 - Product Requirements

- B. Cold-Formed Metal Framing: ASTM C955.

2.2 FRAMING COMPONENTS

- A. Steel Sheet: ASTM A1003/A1003M; Structural Grade, Type H

- 1. Grade: ST50H.

2.3 ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined by performance requirements specified.
- B. Plates, Gussets, Clips: Formed sheet steel, thickness determined by performance requirements specified.
- C. Touch-Up Paint: Match shop primer and finish paint.

2.4 FASTENERS

- A. Self-drilling, Self-tapping Screws, Bolts, Nuts, and Washers: Steel, hot dip galvanized.
- B. Anchorage Devices: Power actuated, drilled expansion bolts, and screws with sleeves.
- C. Welding: In conformance with AWS D1.1 and AWS D1.3.

PART 3 EXECUTION**3.1 EXAMINATION**

- A. Section 013000 - Administrative Requirements: Coordination and project conditions.
- B. Verify substrate surfaces and building framing components are ready to receive Work.
- C. Verify rough-in utilities are in proper location.

3.2 ERECTION OF STUDS

- A. Align floor and ceiling tracks; locate to partition layout. Secure in place with fasteners by welding at maximum 24 inches oc.
- B. Place studs at 16 inches oc; not more than 2 inches from abutting walls and at each side of openings.
- C. Construct corners using minimum three studs. Double stud wall openings, door jambs, and window jambs.
- D. Erect load bearing studs one piece full length. Splicing of studs is not permitted.
- E. Erect load bearing studs, brace, and reinforce to develop full strength, to achieve design requirements.
- F. Fully seat axial loaded studs in receiving tracks maximum 1/16 inch gap between stud and track web).
- G. Install intermediate studs above and below openings to align with wall stud spacing.

- H. Install studs with deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing.
- I. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- J. Touch-up field welds and damaged metallic coatings surfaces with primer to match shop coating.

3.3 ERECTION OF JOISTS PURLINS

- A. Install framing components.
- B. Make provisions for erection stresses. Install temporary bracing to maintain alignment, until permanent bracing and attachments are installed.
- C. Set purlins parallel and level, with lateral bracing and bridging.
- D. Locate joist end bearing directly over load bearing studs or install load distributing member to top of stud track.
- E. Touch-up field welds and damaged metallic coatings surfaces with primer to match shop coating.

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes shop fabricated metal items.
 - 1. Shop-fabricated metal items.
 - 2. Loose steel lintels.
 - 3. Ledge and shelf angles.
 - 4. Elevator sill angles, hoist and divider beams.
 - 5. Bollards.
 - 6. Ladders.
 - 7. Structural supports for miscellaneous attachments.
 - 8. Anchor bolts for sill plates.
- B. Related Sections:
 - 1. Section 03 30 00 - Cast-In-Place Concrete: Execution requirements for embedded anchors and attachments for metal fabrications specified by this section in concrete.
 - 2. Section 04 20 00 - Unit Masonry: Execution requirements for lintels and embedded anchors and attachments for metal fabrications specified by this section in masonry.
 - 3. Section 05 12 00 - Structural Steel: Structural steel column anchor bolts.
 - 4. Section 09 90 00 - Painting and Coating: Field applied paint finish.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
 - 2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 3. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 4. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 5. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - 6. ASTM A269 - Standard Specification for Seamless and Welded Austenitic Stainless-Steel Tubing for General Service
 - 7. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes.
 - 8. ASTM A297/A297M - Standard Specification for Steel Castings, Iron-Chromium and Iron-Chromium-Nickel, Heat Resistant, for General Application.

- 9. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
- 10. ASTM A312/A312M - Standard Specification for Seamless and Welded Austenitic Stainless-Steel Pipes.
- 11. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- 12. ASTM A354 - Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners.
- 13. ASTM A479/A479M - Standard Specification for Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels.
- 14. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- 15. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- 16. ASTM A554 - Standard Specification for Welded Stainless Steel Mechanical Tubing.
- 17. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
- 18. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
- 19. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- 20. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless-Steel Sheet, Strip, Plate, and Flat Bar.
- 21. ASTM A992/A992M - Standard Specification for Structural Steel Shapes.
- 22. ASTM B26/B26M - Standard Specification for Aluminum-Alloy Sand Castings.
- 23. ASTM B85 - Standard Specification for Aluminum-Alloy Die Castings.
- 24. ASTM B177 - Standard Guide for Chromium Electroplating on Steel for Engineering Use.
- 25. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- 26. ASTM B210 - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes.
- 27. ASTM B211 - Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire.
- 28. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

- 29. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
- 30. ASTM F436 - Standard Specification for Hardened Steel Washers.
- 31. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

- B. American Welding Society:
 - 1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
 - 2. AWS D1.1 - Structural Welding Code - Steel.
 - 3. AWS D1.6 - Structural Welding Code - Stainless Steel.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal requirements.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.
- C. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

1.4 QUALITY ASSURANCE

- A. Finish joints in accordance with NOMMA Guideline 1.

1.5 QUALIFICATIONS

- A. Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Accept metal fabrications on site in labeled shipments. Inspect for damage.
- C. Protect metal fabrications from damage by exposure to weather.

1.7 FIELD MEASUREMENTS

- A. Verify field measurements.

PART 2 PRODUCTS

2.1 MATERIALS - STEEL

- A. Structural W-Shapes: ASTM A992/A992M.
- B. Structural Shapes: ASTM A36/A36M.
- C. Channels and Angles: ASTM A36/A36M.
- D. Steel Plate: ASTM A36/A36M.
- E. Steel Pipe: ASTM A53/A53M, Grade B, Schedule 40.
- F. Sheet Steel: ASTM A653/A653M, Grade 33 Structural Quality, galvanized with G90 coating class.

- G. Bolts: ASTM A307; Grade A or B, or ASTM A325; Type 1 when indicated.

- 1. Finish: Unfinished for interior applications, Hot dipped galvanized for exterior applications.

- H. Nuts: ASTM A563 heavy hex type.

- 1. Finish: Unfinished for interior applications, Hot dipped galvanized for exterior applications.

- I. Washers: ASTM F436; Type 1.

- 1. Finish: Unfinished for interior applications, Hot dipped galvanized for exterior applications.

- J. Welding Materials: AWS D1.1; type required for materials being welded.

- K. Shop Primer: SSPC Paint 15, Type 1, red oxide.

- L. Touch-Up Primer: Match shop primer.

- M. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20 Type I Inorganic.

2.2 LINTELS

- A. Lintels: Steel sections, size and configuration as indicated on Drawings, length to allow 8 inches minimum bearing on both sides of opening.
 - 1. Exterior Locations: Galvanized.
 - 2. Interior Locations: Prime paint, one coat.

2.3 LEDGE AND SHELF ANGLES

- A. Ledge and Shelf Angles, Channels and Plates Not Attached to Structural Framing: For support of metal decking, joists and masonry; galvanized where exposed to the exterior.

2.4 ELEVATOR SILL ANGLES, HOIST AND DIVIDER BEAMS

- A. Sill Angles: Steel sections as indicated on Drawings for support of elevator sills; galvanized.
- B. Hoist and Divider Beams: Steel wide flange sections, shape and size required to support applied loads with maximum deflection of 1/240 of the span; prime paint, one coat.

2.5 BOLLARDS

- A. Bollards: Steel pipe, concrete filled, 6 inches diameter, length as indicated on Drawings; galvanized.
 - 1. Crown top of bollard by hand forming concrete or with pre-cast concrete manufactured bollard cap.
- B. Concrete Fill: 3,000 psi as specified in Section 03 30 00.
- C. Anchors: Concealed type as indicated on Drawings.

2.6 LADDERS

- A. Elevator Pit Ladder: ANSI A14.3; steel-welded construction; prime paint.

2.7 ANCHOR BOLTS

- A. Anchor Rods: ASTM F1554; Grade 55, weldable. 105 ksi yield strength.
- B. Shape: Hooked; straight.
- C. Furnish with nut and washer; unfinished.

2.8 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Continuously seal joined members by intermittent welds and plastic filler unless indicated on the structural drawings as continuous welds.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.9 FABRICATION TOLERANCES

- A. Squareness: 1/8-inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION**3.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify field conditions are acceptable and are ready to receive Work.

3.2 PREPARATION

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

3.3 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Make provisions for erection stresses. Install temporary bracing to maintain alignment, until permanent bracing and attachments are installed.
- C. Field weld components indicated on [Drawings and shop drawings.
- D. Perform field welding in accordance with AWS D1.1.
- E. Obtain approval of Architect/Engineer prior to site cutting or making adjustments not scheduled.
- F. After erection, touch up welds, abrasions, and damaged finishes with prime paint or galvanizing repair paint to match shop finishes.

3.4 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation From Plumb: 1/4 inch per story or for every 12 ft in height whichever is greater, non-cumulative.
- C. Maximum Offset From Alignment: 1/4 inch.
- D. Maximum Out-of-Position: 1/4 inch.

3.5 FIELD QUALITY CONTROL

- A. Welding: Inspect welds in accordance with AWS D1.1.

3.6 SCHEDULE

- A. Refer to Architectural and Structural Drawings for specific applications.
- B. Loose Steel Lintels used in masonry: Galvanized.
- C. Elevator Pit Ladder: Primed Steel.
- D. Elevator guide rail plates, beams and anchors: Primed steel.

END OF SECTION

DIVISION 6

WOOD AND PLASTICS AND COMPOSITES

THE AGREEMENT, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, SUPPLEMENTARY CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, AND ALL ADDENDA ARE A PART OF THE CONTRACT. THE CONTRACTOR SHALL CONSULT THEM IN DETAIL FOR INSTRUCTIONS PERTAINING TO THE WORK. THE CONTRACTOR SHALL ALSO CONSULT ALL OTHER DIVISIONS AND SECTIONS OF THE PROJECT MANUAL, AND ALL DRAWINGS IN THE EXECUTION OF THE WORK OF THE CONTRACT.

THE CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, SYSTEMS, EQUIPMENT, ITEMS, ARTICLES, OPERATIONS, AND/OR METHODS LISTED, IMPLIED, MENTIONED, OR SCHEDULED IN THE CONTRACT DOCUMENTS AND/OR NECESSARY AND/OR REQUIRED FOR THE SATISFACTORY COMPLETION OF THE WORK.

THE LISTING OF WORK, REQUIREMENTS, AND PRODUCTS IN THIS SECTION IS NOT INTENDED TO BE CONCLUSIVE. THE CONTRACTOR SHALL CHECK ALL OTHER PARTS OF THE CONTRACT DOCUMENTS AND SHALL PROVIDE ALL MISCELLANEOUS ITEMS OF WORK AND PRODUCTS NECESSARY FOR THE SATISFACTORY COMPLETION OF THE WORK DESCRIBED IN THE CONTRACT DOCUMENTS.

SECTION 06 10 00

ROUGH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes structural floor, wall, and roof framing; built-up structural beams and columns; diaphragm trusses fabricated on site; floor, wall, and roof sheathing; preservative treatment of wood; fire retardant treatment of wood; miscellaneous framing and sheathing.

1.2 REFERENCES

- A. American National Standards Institute:
1. ANSI A135.4 - Basic Hardboard.
 2. ANSI A208.1 - Mat-Formed Wood Particleboard.
- B. American Wood-Preservers' Association:
1. AWPA C1 - All Timber Products - Preservative Treatment by Pressure Process.
 2. AWPA C20 - Structural Lumber - Fire-Retardant Treatment by Pressure Processes.
- C. ASTM International:
1. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
 2. ASTM C1280 - Standard Specification for Application of Gypsum Sheathing.

3. ASTM C1396/C1396M - Standard Specification for Gypsum Board.
4. ASTM D5456 - Standard Specification for Evaluation of Structural Composite Lumber Products.
5. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
6. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
7. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
8. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

- D. National Fire Protection Association:
1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.

- E. U. S Department of Commerce National Institute of Standards and Technology:
1. DOC PS 1 - Construction and Industrial Plywood.
 2. DOC PS 2 - Performance Standard for Wood-Based Structural-Use Panels.
 3. DOC PS 20 - American Softwood Lumber Standard.

- F. National Lumber Grades Authority:

- 1. NLGA - Standard Grading Rules for Canadian Lumber.
- G. Northeastern Lumber Manufacturers Association:
 - 1. NELMA - Standard Grading Rules for Northeastern Lumber.
- H. The Redwood Inspection Service:
 - 1. RIS - Standard Specifications for Grades of California Redwood Lumber.
- I. Southern Pine Inspection Bureau:
 - 1. SPIB - Standard Grading Rules for Southern Pine Lumber.
- J. Underwriters Laboratories Inc.:
 - 1. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
- K. West Coast Lumber Inspection Bureau:
 - 1. WCLIB - Standard Grading Rules for West Coast Lumber.
- L. Western Wood Products Association:
 - 1. WWPA G-5 - Western Lumber Grading Rules.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings For Site Fabricated Truss Frame: Indicate dimensions, wood species and grades, component profiles, drilled holes, fasteners, connectors, erection details and sequence.

- C. Product Data: Submit technical data on insulated sheathing, wood preservative materials, and application instructions.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with the following:
 - 1. Lumber Grading Agency: Certified by DOC PS 20.
 - 2. Wood Structural Panel Grading Agency: Certified by EWA - The Engineered Wood Association.
 - 3. Lumber: DOC PS 20.
 - 4. Wood Structural Panels: DOC PS 1 or DOC PS 2.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Product storage and handling requirements.
- B. Protect trusses from warping or other distortion by stacking in vertical position, braced to resist movement.

PART 2 PRODUCTS

2.1 LUMBER MATERIALS

- A. Lumber Grading Rules: American Softwood Lumber Standard DOC PS 20
- B. Beam Framing: SPF species, No. 2 grade, 19 percent maximum moisture content.
- C. Joist Framing: SPF species, No. 2 grade, 19 percent maximum moisture content.
- D. Rafter Framing: SPF species, No. 2 grade, 19 percent maximum moisture content.

2.2 SHEATHING MATERIALS

- A. Wood Structural Panel Roof Sheathing: EWA Rated Sheathing, Structural I, Plywood, Span Rating 48/24; Exposure Durability 1 or Exterior
- B. Wood Structural Panel Wall Sheathing: EWA Rated Sheathing, Structural I, Plywood, Span Rating 48/24; Exposure Durability 1 or Exterior
- C. Wood Structural Panel Floor Sheathing: EWA Rated Sheathing, Structural I, Plywood, Span Rating 48/24

2.3 UNDERLAYMENT MATERIALS

- A. Plywood Underlayment: EWA Structural I

2.4 SHEATHING AND UNDERLAYMENT LOCATIONS

- A. Sloped Roof Sheathing: 5/8 inch thick, Span Rating 48/24, 48 x 96 inch sized sheets, square edges.
- B. Flat Roof Sheathing: 5/8 inch thick, Span Rating 48/24, 48 x 96 inch sized sheets, square edges.
- C. Floor Sheathing: 3/4 inch thick, Span Rating 48/24, 48 x 96 inch sized sheets, tongue and groove edges.

2.5 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Fasteners: Hot dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
 - 2. Nails and Staples: ASTM F1667.

- B. Structural Framing Connectors: Hot dipped galvanized steel, sized to suit framing conditions, manufactured by Simpson Strong Tie or equivalent.

2.6 FACTORY WOOD TREATMENT

- A. Wood Preservative (Pressure Treatment): AWWA Treatment C1 using water borne preservative with 0.25 percent retainage.
- B. Moisture Content After Treatment:
 - 1. Lumber: Maximum 19 percent.
 - 2. Structural Panels: Maximum 15 percent.

PART 3 EXECUTION**3.1 FRAMING**

- A. Set structural members level and plumb, in correct position.
- B. Fasten framing in accordance with applicable code.
- C. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in alignment until completion of erection and installation of permanent bracing.
- D. Place horizontal members, crown side up.
- E. Construct load bearing framing members full length without splices.
- F. Double members at openings over 24 inches wide. Space short studs over and under opening to stud spacing.
- G. Construct double joist headers at floor and ceiling openings

and under wall stud partitions parallel to floor joists. Frame rigidly into joists.

- H. Bridge framing in excess of 8 feet in span at mid-span. Fit solid blocking at ends of members.
- I. Coordinate installation of wood decking, wood chord metal joists, glue laminated structural units, prefabricated wood trusses, and wood "I" joists.

3.2 SHEATHING

- A. Fasten sheathing in accordance with applicable code.
- B. Secure roof sheathing with longer edge (strength axis) perpendicular to framing members and with ends staggered and sheet ends over bearing.
- C. Use sheathing clips between sheets between roof framing members.
- D. Secure wall sheathing with long dimension parallel to wall studs, with ends over firm bearing.

3.3 FIREBLOCKING AND DRAFTSTOPPING

- A. Install fireblocking to cut off concealed draft openings.
 - 1. Concealed Framed Wall and Furred Spaces: Install fireblocking vertically at floor and ceiling levels and horizontally at maximum 10 feet on center.
 - 2. Connections Between Horizontal and Vertical Spaces: Install fireblocking between vertical walls and partitions and the following:

- a. Horizontal floor and roof framing.
- b. Soffits, dropped ceilings, cove ceilings and other horizontal concealed spaces.
- 3. Stairs: Install fireblocking between stair stringers at top and bottom of each run.

3.4 TOLERANCES

- A. Section 014000 - Quality Requirements: Tolerances.
- B. Framing Members: 1/4 inch from indicated position, maximum.
- C. Surface Flatness of Floor: 1/4 inch in 10 feet maximum, and 1/2 inch in 30 feet maximum.

END OF SECTION

DIVISION 7

THERMAL AND MOISTURE PROTECTION

THE AGREEMENT, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, SUPPLEMENTARY CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, AND ALL ADDENDA ARE A PART OF THE CONTRACT. THE CONTRACTOR SHALL CONSULT THEM IN DETAIL FOR INSTRUCTIONS PERTAINING TO THE WORK. THE CONTRACTOR SHALL ALSO CONSULT ALL OTHER DIVISIONS AND SECTIONS OF THE PROJECT MANUAL, AND ALL DRAWINGS IN THE EXECUTION OF THE WORK OF THE CONTRACT.

THE CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, SYSTEMS, EQUIPMENT, ITEMS, ARTICLES, OPERATIONS, AND/OR METHODS LISTED, IMPLIED, MENTIONED, OR SCHEDULED IN THE CONTRACT DOCUMENTS AND/OR NECESSARY AND/OR REQUIRED FOR THE SATISFACTORY COMPLETION OF THE WORK.

THE LISTING OF WORK, REQUIREMENTS, AND PRODUCTS IN THIS SECTION IS NOT INTENDED TO BE CONCLUSIVE. THE CONTRACTOR SHALL CHECK ALL OTHER PARTS OF THE CONTRACT DOCUMENTS AND SHALL PROVIDE ALL MISCELLANEOUS ITEMS OF WORK AND PRODUCTS NECESSARY FOR THE SATISFACTORY COMPLETION OF THE WORK DESCRIBED IN THE CONTRACT DOCUMENTS.

**SECTION 07 21 16
BLANKET INSULATION**

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Section includes batt insulation in interior ceiling construction for acoustical control.
- B. Related Sections:
 - 1. Section 06 10 00 – Rough Carpentry.
 - 2. Section 09 21 16 - Gypsum Board Assemblies.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - 2. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 3. ASTM E970 – Standard Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation.

1.3 SYSTEM DESCRIPTION

- A. Materials of This Section: Provide acoustical attenuation within interior partitions and between specified rooms.

1.4 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate the Work with Section 09 21 13 for installation of framing and gypsum panels.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit manufacturer data on product characteristics, performance criteria, and limitations.
- C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

- A. Insulation Installed in Concealed Locations Surface Burning Characteristics:
 - 1. Batt Insulation: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- B. Insulation Installed in Exposed Locations Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' experience.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Store according to manufacturer instructions.
- D. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Remove insulation that becomes wet or damp.
 - 3. Provide additional protection according to manufacturer instructions.

PART 2 PRODUCTS

2.1 BATT INSULATION

- A. Manufacturers: Fiberglass acoustic batt insulation
 - 1. Owens Corning Fiberglas: EcoTouch Sound Attenuation Batts Insulation.
 - 2. Substitutions: Section 01 60 00 - Product Requirements

2.2 COMPONENTS

- A. Batt Insulation: ASTM C665, Type I; preformed glass fiber batt or roll; friction fit, conforming to the following:
 - 1. Thermal Resistance for thermal batts: Minimum R-13.
 - 2. Size:
 - a. 24X48 inch at installations above suspended acoustical ceilings.
 - b. 16 inch wide batts or rolls sized to fit ceiling framing, length in manufacturer's standard lengths as appropriate for conditions of the project.
 - 3. Facing: Unfaced.
- B. Insulation Fasteners: Steel impale spindle and clip on flat metal base, self adhering backing, length to suit insulation thickness, capable of securely and rigidly fastening insulation in place.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify substrate, adjacent materials, and insulation are dry and ready to receive insulation.

3.2 INSTALLATION

- A. Install in ceiling spaces without gaps or voids. Do not compress insulation.

- B. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- C. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within plane of insulation.

3.3 SCHEDULES

- A. Interior Wood Framed Ceilings scheduled for insulation.
- B. Interior Suspended Acoustical Tile Ceilings scheduled for insulation.

END OF SECTION

**SECTION 07 21 16.16
INSULATING LINER SYSTEM**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Insulation and liner system for new Pre-Engineered Building Construction.

1.2 REFERENCE STANDARDS

- A. ASTM International:
1. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 2. ASTM C991 - Standard Specification for Flexible Fibrous Glass Insulation for Metal Buildings
 3. ASTM C 1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.
 4. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 5. ASTM E96 - Standard Test Method for Water Vapor Transmission of Materials in Sheet Form (Procedure B).
- B. National Fire Protection Association
1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
- C. Underwriters Laboratory
1. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

1.3 PREINSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Requirements for preinstallation meeting.
- B. Convene minimum one week prior to commencing Work of this Section.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Installation instructions.
- C. Shop Drawings:
1. Indicate locations of connections and attachments, general details, anchorages and method of anchorage and installation.

1.5 QUALITY ASSURANCE

- A. Insulation Installed in Concealed Locations Surface Burning Characteristics:

1. Batt Insulation: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
2. Insulation Installed in Exposed Locations Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' experience.
- B. Installer: Company with experiencing products specified in this Section with minimum three years' experience.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Store according to manufacturer instructions.
- D. Protection:
1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 2. Remove insulation that becomes wet or damp.
 3. Provide additional protection according to manufacturer instructions.

1.8 EXISTING CONDITIONS

- A. Field Measurements: Verify field measurements prior to fabrication. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

- A. System must have maximum U-Factor of 0.035.
- B. Insulating system shall have thermal breaks as necessary, and a continuous vapor barrier inside of building purlins, girts, and insulation to provide complete isolation from inside conditioned air.

2.2 MANUFACTURER:

- A. Thermal Design, Inc. – Simple Saver System.
1. www.thermaldesign.com
 2. (800) 255-0776

2.3 MATERIALS

- A. Simple Saver System consists of Batt Insulation, Roof Insulation, Wall Insulation, Vapor Barrier Liner Fabric, Thermal Breaks, Straps, and other devices and components in a proprietary insulation system as follows:

1. Batt Insulation: ASTM C 991 Type 1; preformed formaldehyde-free glass fiber batt conforming to the following:
 - a. Thermal Resistance: R of 32.
 - b. Batt Size: Equal to purlin/girt spacing by manufacturer's standard lengths.
 - c. Unfaced.
2. Roof Insulation: Formaldehyde-free fiberglass batt or fiberglass blanket complying with ASTM C 991 Type 1 and ASTM E 84 with a thermal resistance and thickness as follows:
 - a. R-32; 10 inches, 6 inches plus 4 inches two layers.
3. Vapor Barrier Liner Fabric: Syseal® type woven, reinforced, high-density polyethylene yarns coated on both sides with a continuous white or colored polyethylene coatings, as follows:
 - a. Product complies with ASTM C 1136, Types I through Type VI.
 - b. Perm rating: 0.02 for fabric and for seams in accordance with ASTM E96.
 - c. Flame/Smoke Properties:
 - 1) 25/50 in accordance with ASTM E 84.
 - 2) Self-extinguishes with field test using matches or butane lighter.
 - d. Ultra violet radiation inhibitor to minimum UVMAX® rating of 8.
 - e. Size and seaming: Manufactured in large custom pieces by extrusion welding from roll goods and fabricated to substantially fit defined building area with minimum practicable job site sealing.
 - f. Provide with factory double, extrusion welded seams. Stapled seams or heat-melted seams are not acceptable due to degradation of fabric.
 - g. Factory-folded to allow for rapid installation.
 - h. Color: White
4. Vapor Barrier Lap Sealant: Solvent-based, Simple Saver polyethylene fabric adhesive.
5. Vapor Barrier Tape: Double-sided sealant tape 3/4-inch-wide by 1/32 inch thick.
6. Vapor Barrier Patch Tape: Single-sided, adhesive backed sealant tape 3 inches wide made from same material as Syseal® type liner fabric.
7. Thermal Breaks:
 - a. 1/8 inch thick by 3 inch wide white, closed-cell polyethylene foam with pre-applied adhesive film and peel-off backing.
 - b. Polystyrene Snap-R snap-on thermal blocks.
8. Straps:
 - a. 100 KSI minimum yield tempered, high-tensile-strength steel.
 - b. Size: Not less than 0.020 inch thick by 1 inch by continuous length.
 - c. Galvanized, primed, and painted to match specified finish color on the exposed side.
 - d. Color: White
9. Fasteners:
 - a. For light gage steel: #12 by 3/4 inch plated Tek 2 type screws with sealing washer, painted to match specified color.
 - b. For heavy gage steel: #12 by 1-1/2 inch plated Tek 4 type screws with sealing washer, painted to match specified color.
 - c. For wood, concrete, other materials: As recommended by manufacturer.
10. Wall Insulation Hangers: Fast-R preformed rigid hangers, 32 inch long galvanized steel strips with barbed arrows every 8 inches along its length.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify that field conditions are acceptable and are ready to receive Work.
- C. Verify that building structure including all bracing and any concealed building systems are completed and approved prior to installing liner system and insulation in the structure.
- D. Correct any unsatisfactory conditions before proceeding.

3.2 INSTALLATION - GENERAL

- A. Install pre-engineered building insulation system in accordance with manufacturer's installation instructions and the approved shop drawings.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Install in exterior spaces without gaps or voids. Do not compress insulation.
- D. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- E. Fit insulation tight in spaces and tight to exterior side of the sealed liner fabric and around mechanical and electrical services within plane of insulation.

3.3 INSTALLATION – ROOF INSULATION

- A. Straps:

1. Cut straps to length and install in the pattern and spacings indicated on shop drawings.
2. Tension straps to required value.
- B. Vapor Barrier Fabric:
 1. Install vapor barrier fabric in large one-piece custom fabricated pieces to substantially fit defined building areas with minimum practicable job site sealing.
 2. Position pre-folded fabric on the strap platform along one eave purlin.
 3. Clamp the two bottom corners at the eave and also centered on the bay.
 4. Pull the other end of the pleat-folded fabric across the building width on the strap platform, pausing only at the ridge to fasten the straps and fabric in position where plane of roof changes and to release temporary fasteners on the opposite ridge purlins.
 5. Once positioned, install fasteners from the bottom side at each strap/purlins intersection.
 6. Trim edges and seal along the rafters.
 7. All seams must be completely sealed and stapled seams not acceptable.
- C. Insulation:
 1. Unpack, and shake to a thickness exceeding the specified thickness.
 2. Ensure that cavities are filled completely with insulation.

3. Place on the vapor barrier liner fabric without voids or gaps.
4. Place top layer of insulation over and perpendicular to the purlins without voids or gaps, as roof sheathing is applied.
5. Place thermal block on top of purlins or bottom of purlins for retrofit work, if no other thermal break exists.
6. Place new insulation between purlins at the required thickness for the R-value specified.
- D. Seal vapor barrier fabric to the wall fabric and elsewhere as required to provide a continuous vapor barrier.

3.4 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.
- B. Clean dirt or exposed sealant from the exposed vapor barrier fabric.
- C. Remove scraps and debris from the site.

3.5 PROTECTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Protect system products until completion of installation.
- C. Repair or replace damaged products before completion of insulation system

3.6 SCHEDULE

- A. New insulation assembly for entire roof.

END OF SECTION

SECTION 07 26 16
UNDER SLAB VAPOR BARRIER

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Vapor barrier, seam tape and mastic for installation under concrete slabs.
- B. Related Requirements:
 - 1. Section 03 30 00 – Cast-In-Place Concrete.
 - 2. Section 31 31 16 – Termite Treatment.

1.2 REFERENCE STANDARDS

- A. ASTM International:
 - 1. ASTM E96 - Standard Test Method for Water Vapor Transmission of Materials.
 - 2. ASTM E154 - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls or as Ground Cover.
 - 3. ASTM E1643 – Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
 - 4. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil and Granular Fill Under Concrete Slabs.

1.3 SYSTEM DESCRIPTION

- A. Vapor Barrier (Under Slab): Shall conform to ASTM E1745, Class A and shall have a maximum water vapor permeance of 0.0095 perms when tested in accordance with ASTM E96. Vapor Barrier shall be no less than 15 mils thick.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data on vapor barrier, seam tape and mastic.
- C. Manufacturer's Instructions: Manufacturer's installation instructions.

PART 2 PRODUCTS

2.1 MANUFACTURERS AND MATERIALS

- A. Stego Industries LLC., 887-464-7834
 - 1. Stego Wrap – 15 mil.
- B. Raven Industries, 605-336-2750;
 - 1. VaporBlock -15 mil.
- C. WR Meadows. 800-342-5976
 - 1. Perminator – 15 mil.
- D. Epro Waterproofing Systems, 800-882-1896
 - 1. Ecoshield-E15 mil.

2.2 ACCESSORIES

- A. Seam tape: as recommended by manufacturer.
- B. Mastic: as recommended by manufacturer.

PART 3 EXECUTION

3.1 PREPARATION

- A. Verify that substrate conditions are acceptable for product installation in accordance with manufacturer's instructions.

3.2 INSTALLATION

- A. Install vapor barrier in accordance with manufacturer's instructions and ASTM E1643.
- B. Lay sheet smoothly, stretch and weight edges, lap joints 12 inches and seal with tape as specified by vapor barrier manufacturer. Turn barrier up 6 inches at walls and at all pipes, abutments, etc. Tape and seal at penetrations and edges.
- C. At grade beams, extend vapor barrier down sides of beam trenches and footing excavations to within 4 inches of trench bottom and secure to sides of trench. Do not extend barrier across bottom of beam.

3.3 PATCHING

- A. Patch and repair all punctures with a minimum overlap of 6 inches in all directions and tape around entire perimeter of repair.

END OF SECTION

SECTION 07 42 13
INSULATED METAL WALL PANELS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Foamed-insulation-core concealed fastener metal wall panels, with related metal trim and accessories.

1.2 RELATED REQUIREMENTS

- A. Section 05 12 00 Structural Steel - Steel framing supporting metal panels.
- B. Section 05 40 00 Cold-Formed Metal Framing - Cold-formed metal framing supporting metal panels.
- C. Section 07 62 00 Sheet Metal Flashing and Trim - Sheet metal flashing items in addition to items specified in this Section.
- D. Section 07 61 00 Sheet Metal Roofing - Factory-formed metal roof and soffit panels.
- E. Section 13 34 19 Metal Building Systems - Steel framing supporting metal panels.

1.3 REFERENCES

- A. American Society of Civil Engineers (ASCE): www.asce.org/codes-standards:
 - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- B. ASTM International (ASTM): www.astm.org:
 - 1. ASTM A 653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. ASTM A 755 - Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Pre-painted by the Coil-Coating Process for Exterior Exposed Building Products.
 - 3. ASTM A 792 - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - 4. ASTM A 240 - Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General

- Applications.
- 5. ASTM C 518 - Standard Test Method for Steady State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- 6. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus.
- 7. ASTM D 1621 - Compressive Properties of Rigid Cellular Plastics.
- 8. ASTM D 1622 - Apparent Density of Rigid Cellular Plastics.
- 9. ASTM D 2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
- 10. ASTM D 4214 - Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.
- 11. ASTM D 6226 - Standard Test Method for Open Cell Content of Rigid Cellular Plastics.
- 12. ASTM E 72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
- 13. ASTM E 84 - Test Methods for Surface Burning Characteristics of Building Materials.
- 14. ASTM E 283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- 15. ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
- 16. ASTM E 1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
- C. National Fire Protection Association

(NFPA):

1. NFPA 259 – Test Method for Potential Heat of Building Materials.
 2. NFPA 285 – Evaluation of Fire Propagation Characteristics of Exterior Non-Load Bearing Wall Assemblies.
 3. NFPA 286 – Fire Test of Evaluating Conditions of Wall and Ceiling Finish to Roof Fire Growth.
- D. FM Global (FM): www.fmglobal.com:
1. FM 4880 American National Standard for Evaluating Insulated Wall and Roof/Ceiling Assemblies.
 2. FM 4881 Approval Standard for Class 1 Exterior Wall Systems.

1.4 QUALITY ASSURANCE

- A. Manufacturer/Source: Provide metal panel assemblies and accessories from a single manufacturer.
- B. Manufacturer Qualifications: Approved manufacturer listed in this Section with minimum five years' experience in the manufacturing of similar products and successful use in similar applications.
- C. Installer Qualifications: Experienced Installer with minimum of five years' experience with successfully completed projects of a similar nature and scope.

1.5 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation Meeting: Prior to erection of framing, conduct pre-installation meeting at site attended by Owner, Architect, metal panel installer, metal panel manufacturer's technical representative, inspection agency and related trade contractors.
 1. Coordinate building framing in relation to metal panel system.
 2. Coordinate openings and penetrations of metal panel system.

1.6 ACTION SUBMITTALS

- A. Product Data: Manufacturer's data sheets for specified products.
- B. Shop Drawings: Show layouts of metal panels. Include details of each condition of installation, panel profiles, and attachment to building. Provide details at a minimum scale 1-1/2-inch per foot of edge conditions, joints, fastener and sealant placement,

flashings, openings, penetrations, and special details. Make distinctions between factory and field assembled work.

1. Include data indicating compliance with performance requirements.
 2. Indicate points of supporting structure that must coordinate with metal panel system installation.
 3. Include structural data indicating compliance with performance requirements and requirements of local authorities having jurisdiction.
- C. Samples for Initial Selection: For each exposed product specified including sealants. Provide representative color charts of manufacturer's full range of colors.
- D. Samples for Verification:
1. Provide 12-inch- (305 mm) long section of each metal panel profile.
 2. Provide color chip verifying color selection.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Manufacturer's Warranty: Executed copy of manufacturer's warranty.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect products of metal panel system during shipping, handling, and storage to prevent staining, denting, deterioration of components or other damage. Protect panels and trim bundles during shipping. Protect painted surfaces with a protective covering before shipping.
 1. Deliver, unload, store, and erect metal panels and accessory items without deforming panels or exposing panels to surface damage from weather or construction operations.
 2. Store in accordance with Manufacturer's written instructions.
 3. Shield foam insulated metal panels from direct sunlight until all components are installed.

1.9 WARRANTY

- A. Manufacturer's Warranty: Submit Manufacturer's two (2) year limited warranty providing panels to be free

- from defects in materials and workmanship, beginning from the date of substantial completion excluding coil coatings (paint finishes) that are covered under a separate warranty.
- B. The installation contractor shall issue a separate warranty against defects in installed materials and workmanship, beginning from the date of substantial completion of the installation.
 - C. Special Panel Finish Warranty: Submit Manufacturer's limited warranty on the exterior paint finish for adhesion to the metal substrate and limited warranty on the exterior paint finish for chalk and fade.
 1. Fluoropolymer Two-Coat System:
 - a. Color fading in excess of 10 for copper, silver metallic and bright red; Hunter units per ASTM D 2244.
 - b. Chalking in excess of 6 for copper, silver metallic and bright red or 8 rating per ASTM D 4214.
 - c. Failure of adhesion, peeling, checking, or cracking.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. MBCI; (Basis of Design); www.mbc.com.
- B. Metl-Span; www.metlspan.com.
- C. Substitutions: Section 01 60 00 - Product Requirements.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Provide metal panel system meeting performance requirements as determined by application of specified tests by a qualified testing facility on manufacturer's standard assemblies.
 1. Wind Loads: Determine loads based on applicable building code, wind speed, importance factor, exposure category, and internal pressure coefficient indicated on drawings.
 - a. Wind Negative Pressure: Certify capacity of metal panels by testing of proposed assembly.
 2. Deflection Limits: Withstand inward and outward wind-load design

- pressures in accordance with applicable building code with maximum deflection of 1/120 of the span with no evidence of failure.
- B. FM Approvals Listing: Comply with FM Approval 4881. Provide metal wall panel assembly listed in FM Approvals' "Approval Guide".
 - C. Fire Performance Characteristics: Provide metal panel systems with the following fire-test characteristics determined by indicated test standard as applied by testing and inspection agency acceptable to authorities having jurisdiction.
 1. Surface-Burning Characteristics: The insulating core shall have been tested per ASTM E 84. The core shall have:
 - a. Flame spread index: 25 or less.
 - b. Smoke developed index: 450 or less.
 2. Room Test Performance: FM Global 4880: The panel assembly shall not support a self-propagating fire which reaches any limits of the 50' (15.24m) high corner test structure as evidenced by flaming or material damage of the ceiling of the assembly.
 3. Fire Propagation: The fire assembly shall meet the requirements of the standard for NFPA 285.
 4. Fire Growth: The fire assembly shall meet the requirements of the standard for NFPA 286.
 5. Potential Heat: Determined in accordance with NFPA 259.
 6. IBC Chapter 26: Panel Performance under the above test methods, shall meet the requirements of IBC, Chapter on foam plastics.
 - D. Air Infiltration, ASTM E 283:
 1. Maximum 0.0002 cfm/sq. ft. (0.001 L/s per sq. m) at static air pressure difference of 1.57 lbf/sq. ft. (75 Pa).
 2. Maximum 0.0009 cfm/sq. ft. (0.005 L/s per sq. m) at static-air-pressure difference of 6.24 lbf/sq. ft. (300 Pa).
 3. Maximum 0.01 cfm/sq. ft. (0.050 L/s per sq. m) at static-air-pressure difference of 20 lbf/sq. ft. (958 Pa).

- E. Water Penetration Static Pressure:
 - 1. ASTM E 331: No uncontrolled water penetration at a static pressure of 20 lbf/sq. ft. (958 Pa).
 - 2. ASTM E 331 Modified (2 hour duration): No uncontrolled water penetration at a static pressure of 6.24 lbf/sq. ft. (300 Pa).
- F. Thermal Movements: Allow for thermal movements from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction. Allow for deflection and design for thermal stresses caused by temperature differences from one side of the panel to the other.
- G. Thermal Performance: When tested in accordance with ASTM C 518, Measurement of Steady State thermal Transmission, the panels shall provide a k factor of 0.14 btu/sf/hr/deg F at a 75° F (24° C) mean temperature, as required by code, or 0.126 btu/sf/hr/deg F at a 40° F (4° C) mean temperature.

2.3 INSULATED METAL WALL PANELS

- A. Concealed Fastener, Insulated Metal Wall Panels with foam core: Structural metal panels consisting of flat exterior metal sheet with 7.2 rib pattern, and interior metal sheet with mesa profile, with factory foamed-in-place polyurethane core in thermally-separated profile, with tongue-and-groove panel edges, attached to supports using concealed fasteners.
 - 1. Basis of Design: MBCI, CF 7.2 Insul-Rib.
 - 2. G-90 galvanized coated steel conforming to ASTM A 653 and/or AZ50 aluminum-zinc alloy coated steel, conforming to ASTM A 792/A 792M, minimum grade 33, pre-painted by the coil-coating process per ASTM A 755/A 755M.
 - a. Exterior Face Sheet: 24 gauge thickness, with stucco embossed surface.
 - 1) Finish: Fluoropolymer two-coat system.
 - 2) Color: As selected by

- Architect from manufacturer's standard colors to match existing.
- b. Interior Face Sheet: 24 gauge thickness, with stucco embossed surface and Mesa profile.
 - 1) Finish: Polyester two-coat system.
 - 2) Color: As selected by Architect from manufacturer's standard colors to match existing.
- 3. Panel Width: 36 inches (914 mm).
- 4. Panel Thickness: 4 inch (102 mm). Panel thickness measured from inside skin to top of high cell.
- 5. Insulating Core: Polyurethane with zero ozone depletion potential blowing agent:
 - a. Closed Cell Content: 90% or more as determined by ASTM D 6226.
 - b. Compressive Strength: As required to meet structural performance requirements and with a minimum of 15 psi as determined by ASTM D 1621.
 - c. Minimum Density: 2.0 pcf (32 kg/m³) as determined by ASTM D 1622.
 - d. Thermal Resistance R-Value: Min. R-18; deg. F * hr * sq. ft./Btu (K * sq. m/W) per ASTM C 518 at 75 degrees Fahrenheit mean temperature.
- 6. Heat Transfer Coefficient (U-factor): Max. U-0.05; Btu/hr * sq. ft. * deg. F (W/K * sq. m) as determined by ASTM C 1363 at 75 degrees Fahrenheit mean temperature.

2.4 METAL WALL PANEL ACCESSORIES

- A. General: Provide complete metal panel assemblies incorporating trim, copings, fasciae, gutters and downspouts, and miscellaneous flashings. Provide required fasteners, closure strips, and sealants as indicated in manufacturer's written instructions.
- B. Flashing and Trim: Match material, thickness, and finish of metal panels.
- C. Panel Clips: ASTM A 653/A 653M, G90 (Z180) hot-dip galvanized zinc coating,

one-piece, configured for concealment in panel joints, and identical to clips utilized in tests demonstrating compliance with performance requirements.

- D. Panel Fasteners: Self-drilling or Self-tapping screws and other acceptable fasteners recommended by metal panel manufacturer. Where exposed fasteners cannot be avoided, supply corrosion-resistant fasteners with heads matching color of metal panels by means of factory-applied coating, with weathertight resilient washers.
- E. Joint Sealers:
 - 1. Sealants: Provide Tape Mastic Sealants, Non-skinning sealants, and Urethane Sealants in accordance with manufacturers standards.
 - 2. Vertical Joint Gasket: Manufacturers standard EPDM gasket. Color: Black.

2.5 FABRICATION

- A. General: Provide factory fabricated and finished metal panels, trim, and accessories meeting performance requirements, indicated profiles, and structural requirements.
- B. Fabricate metal panel joints configured to accept sealant providing weathertight seal.
- C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's written instructions, approved shop drawings, and project drawings.

2.6 FINISHES

- A. Finishes, General: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.
- B. Exterior Face Sheet Coil-Coated Finish System:
 - 1. Fluoropolymer Two-Coat System: 0.2 – 0.3 mil primer with 0.7 - 0.8 mil 70 percent PVDF fluoropolymer color coat, AAMA 621, meeting solar reflectance index requirements.
 - a. Basis of Design: MBCI, Fluoropolymer.

- C. Interior Face Sheet Coil-Coated Finish System:

- 1. Polyester Two-Coat System: 0.20 – 0.25 mil primer with 0.7 – 0.8 mil color coat.
 - a. Basis of Design: MBCI, Igloo White.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine metal panel system substrate with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of metal panels.
 - 1. Inspect framing that will support insulated metal panels to determine if support components are installed as indicated on approved shop drawings and are within tolerances acceptable to metal panel manufacturer and installer. Confirm presence of acceptable framing members at recommended spacing to match installation requirements of metal panels.
 - 2. Panel Support Tolerances: Confirm that metal panel supports are within tolerances acceptable to metal panel manufacturer but not greater than the following:
 - a. 1/4 inch (6 mm) in 20 foot (6100 mm) in any direction.
 - b. 3/8 inch (9 mm) over any single wall plane.
 - c. Girt Spacing 8 feet (2438 mm) or more: 1/4 inch (6 mm) out only.
 - d. Girt Spacing Less Than 8 feet (2438 mm): 1/8 inch (3 mm) out only.
 - e. CF Architectural girt spacing less than 4 feet (1219 mm): 1/16 inch (1.5 mm) inch out only.
- B. Correct out-of-tolerance work and other deficient conditions prior to proceeding with insulated metal panel installation.

3.2 METAL PANEL INSTALLATION

- A. Concealed-Fastener Insulated Metal Panels with foam core: Install metal panel system in accordance with manufacturer's written instructions,

- approved shop drawings, and project drawings. Install metal panels in orientation, sizes, and locations indicated. Anchor panels and other components securely in place. Provide for thermal and structural movement.
- B. Attach panels to metal framing using screws, fasteners, sealants, and adhesives recommended for application by metal panel manufacturer.
1. Fasten metal panels to supports with fasteners at each location indicated on approved shop drawings, at spacing and with fasteners recommended by manufacturer.
 2. Cut panels in field where required using manufacturer's recommended methods.
 3. Provide weatherproof jacks for pipe and conduit penetrating metal panels.
 4. Dissimilar Materials: Where elements of metal panel system will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by metal panel manufacturer.
- C. Attach panel flashing trim pieces to supports using recommended fasteners and joint sealers.
- D. Joint Sealers: Install sealants where indicated and where required for weatherproof performance of metal panel assemblies.
1. Seal panel base assembly, openings, panel head joints, and perimeter joints using sealants indicated in manufacturer's instructions.
 2. Seal wall panel joints; apply continuously without gaps in accordance with manufacturer's

written instructions, approved shop drawings, and project drawings.

3. Prepare joints and apply sealants per requirements of Section 07 90 00.

3.3 ACCESSORY INSTALLATION

- A. General: Install metal panel accessories with positive anchorage to building and weather tight mounting; provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal panel assembly, including trim, copings, flashings, sealants, closure strips, and similar items.
 2. Comply with details of assemblies utilized to establish compliance with performance requirements and manufacturer's written installation instructions.
 3. Set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently weather resistant.

3.4 FIELD QUALITY CONTROL

- A. Water-Spray Test: After completing portion of metal panel assembly including accessories and trim, test 2-bay area selected by Architect for water penetration, according to AAMA 501.2.

3.5 CLEANING AND PROTECTION

- A. Remove temporary protective films immediately in accordance with metal panel manufacturer's instructions. Clean finished surfaces as recommended by metal panel manufacturer.
- B. Replace damaged panels and accessories that cannot be repaired to the satisfaction of the Architect.

END OF SECTION

**SECTION 07 61 00
SHEET METAL ROOFING**

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes
 - 1. Pre-finished galvalume sheet steel roofing, associated flashings, and underlayment.
 - 2. Flashings.
 - 3. Underlayment.
- B. Related Sections:
 - 1. Section 06 10 00 - Rough Carpentry: Plywood roof deck substrate, wood blocking and battens for metal roofing substrate profiles.
 - 2. Section 07 21 16.16 – Insulating Liner System.
 - 3. Section 07 62 00 - Sheet Metal Flashing and Trim.
 - 4. Section 07 71 23 - Gutters and Downspouts.
 - 5. Section 07 90 00 - Joint Protection.

1.2 REFERENCES

- American Architectural Manufacturers Association:
 - 1. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
- B. ASTM International:
 - 1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. ASTM A755/A755M - Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
 - 3. ASTM A792 – Standard Specification for Steel Sheet, 55% Aluminum Zinc Alloy Coated by the Hot Dip Process.
 - 4. ASTM C1371-2004 - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.
 - 5. ASTM C1549-2004 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
 - 6. ASTM D1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
 - 7. ASTM D4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free.
 - 8. ASTM E408-1971(1996)e1 - Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.
 - 9. ASTM E903-1996 - Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres.

- 10. ASTM E1918-1997 - Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.
- 11. ASTM E1980-2001 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.
- C. Federal Specification Unit:
 - 1. FS TT-C-494 - Coating Compound, Bituminous, Solvent Type, Acid Resistant.
- D. NRCA (National Roofing Contractors Association)
 - 1. NRCA Roofing and Waterproofing Manual.
- E. Sheet Metal and Air Conditioning Contractors:
 - 1. SMACNA - Architectural Sheet Metal Manual.
- F. U.S. Environmental Protection Agency:
 - 1. ENERGY STAR - ENERGY STAR Voluntary Labeling Program.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit fabricator data on metal types, finishes, and characteristics.
- C. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- D. Samples:
 - 1. After initial color selection by Architect, submit two samples, for final approval, 4x6 inch in size, minimum, illustrating metal finish color.
- E. Fabricator's Certificate: Certify that products meet or exceed specified requirements.
- F. Fabricator Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
- G. Qualifications Statements:
 - 1. Submit qualifications for fabricator and installer.
 - 2. Submit fabricator's approval of installer.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with SMACNA Architectural Sheet Metal Manual requirements and standard details, except as otherwise noted.

1.5 QUALIFICATIONS

- A. Fabricator: Company specializing in fabricating products specified in this Section with minimum five years' experience.
- B. Installer: Company specializing in performing Work of this Section with minimum five years experience and approved by the manufacturer.

1.6 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.
- C. Required attendees: Owner, Architect, General Contractor, and sub-contractors installing roofing, sheet metal trim, gutters, and board insulation installer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
 - 1. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
 - 2. Storage:
 - a. Store materials according to fabricator instructions.
 - b. Stack material to provide ventilation and to prevent twisting, bending, and abrasion.
 - c. Slope metal sheets to ensure drainage.
 - 3. Protection:
 - a. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - b. Prevent contact with materials causing discoloration or staining.
 - c. Provide additional protection according to fabricator instructions.

1.8 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate with Work of Section 04 20 00 for installing recessed flashing reglets.

1.9 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication.
 - 2. Indicate field measurements on Shop Drawings.

1.10 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Finish Warranty: Furnish twenty-year manufacturer warranty for custom sheet metal roofing finish.
- C. Watertightness Warranty: Furnish ten-year manufacturer watertightness warranty for custom sheet metal roofing.

PART 2 PRODUCTS**2.1 CUSTOM STEEL SHEET METAL ROOFING MANUFACTURERS**

- A. Manufacturers:
 - 1. AEP Span; Span-Lok HP.

- 2. Berridge Manufacturing Company; Zee-Lock.
- 3. Fabral; Stand 'N Seam.
- 4. MBCI Systems; SuperLok (basis of design).
- 5. McElroy Metal; Maxima 2".
- 6. Petersen Aluminum; Tite-Loc Plus.
- 7. Ultra Seam; US-200.
- 8. Substitutions: Section 01 60 00 - Product Requirements.

2.2 CUSTOM SHEET METAL ROOFING MATERIALS

- A. Pre-Finished Galvalume Steel Sheet: ASTM A755/A755M; structural steel sheet, AZ50 or AZ55 aluminum-zinc alloy coating; 0.024-inch-thick core steel, shop pre-coated with two coat fluoropolymer top coat.

2.3 ACCESSORIES

- A. Fasteners: Concealed Stainless steel with soft neoprene washers, UL 90 rated.
- B. Polymer Underlayment: One of four options listed below with a minimum upper service temperature of 240 degrees F.
 - 1. 40 mil high density cross laminate polyethylene with butyl rubber based or modified asphalt adhesive membrane.
 - a. Meet ASTM D1970.
 - b. Grace Construction Products; Ice & Water Shield HT
 - 2. 30 mil high density cross laminate polyethylene with butyl rubber based or modified asphalt adhesive membrane.
 - a. Meet ASTM D1970.
 - b. Grace Construction Products; Ultra.
 - 3. 50 mil high density cross laminate coal tar elastomeric with modified asphalt adhesive membrane.
 - a. Hyload; Hybase SAM
 - 4. 25 mil high density cross laminate polymer with butyl rubber based or modified asphalt adhesive membrane.
 - a. Meet ASTM D1970.
 - b. Interwrap; Titanium UDL-30.

2.4 FABRICATION

- A. Form sections shape as indicated on Drawings, accurate in size, square, and free from distortion or defects.
- B. Fabricate cleats of same material as sheet, to interlock with sheet.
- C. Fabricate starter strips of same material as sheet, continuous, to interlock with sheet.
- D. Form pieces in longest practical lengths and in single-length sheets.
- E. Corners:
 - 1. Fabricate corners from one piece, with minimum 18-inch (450-mm)-long legs.
 - 2. Seam for rigidity, and seal with sealant.
 - 3. Miter and seam corners.
- F. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- G. Seams:

1. Form material with standing seams, except where otherwise indicated.
2. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- H. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.
- I. Flashings:
 1. Fabricate and install in accordance with Section 07 62 00.
 2. Fabricate flashings to allow toe to extend 2 inches over roofing.
 3. Return and brake edges.

2.5 FACTORY FINISHING

- A. Fluoropolymer Coating: Multiple coat as specified for sheet metal system, thermally cured, conforming to AAMA 2605.
 1. Smooth Striated.
 2. Color: As selected by Architect from manufacturer's full color line to match existing.
- B. Washcoat: Finish concealed side of metal sheets with washcoat compatible with finish system, as recommended by finish system manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Inspect roof deck to verify deck is clean and smooth, free of depressions, waves, or projections, and properly sloped to drains, valleys, and eaves.
- C. Verify correct placement of wood nailers and insulation positioning between nailers.
- D. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, reglets are in place, and nailing strips located.
- E. Verify roofing termination and base flashings are in place, sealed, and secure.

3.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.
- B. Broom clean deck surfaces under eave protection and underlayment.
- C. Install starter and edge strips, and cleats before starting installation. Coordinate with work of Sections 07 62 00 and 07 71 23.
- D. Reglets:
 1. Install surface mounted reglets to lines and levels indicated on Drawings.
 2. Seal top of reglets with sealant. Reference Section 07 62 00.
- E. Back paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to minimum dry film thickness of 15 mil.

3.3 INSTALLATION

- A. Underlayment:
 1. Apply underlayment over entire roof area in single layer laid perpendicular to slope; weather lap edges 4 inches in the horizontal and 6 inches in the vertical. Secure with self-stick adhesive or nail in place in accordance with manufacturer's instructions. Minimize nail quantity.
- B. General Roofing Installation Requirements:
 1. Install roofing panels in accordance with manufacturer's specific installation instructions and in conformance with SMACNA Architectural Sheet Metal Manual, and as described below, in order to achieve a watertight installation.
 2. Cleat and seam joints.
 3. Install sealants for preformed roofing panels as directed by the manufacturer.
 4. Provide formed metal pans for protrusions through roof. Fill pans watertight with plastic cement.
 5. Protect installed roof panels and trim from damage caused by adjacent construction until completion of installation.
 6. At eaves ends, terminate roofing by hooking over edge strip.
 7. Install fascia trim and gutters at applicable roofs in accordance with sections 07 62 00 and 07 71 23 for a complete system application.
 8. Do not allow panels or trim to come into contact with dissimilar materials. Back paint surfaces in contact with dissimilar materials with bituminous coating.
 9. Remove and replace any panels or components which are damaged beyond repair.
- C. Standing Seam Roofing Installation:
 1. Space standing seams at 16-inch oc.
 2. Eaves:
 - a. Lay sheets with long dimension perpendicular to eaves.
 - b. Apply pans beginning at eaves. Install panels in such a manner that horizontal lines are true and level and vertical lines are plumb and perpendicular to horizontal elements.
 3. Install fasteners through anchor clips to penetrate through substrate and into the perpendicular steel purlins supporting the deck. Use plastic cement for joints between metal and bitumen and for joints between metal and sheet underlayment.
 4. Provide panels in full length from ridge to eave when possible. When not full length from ridge to eave is not feasible or outside of manufacturer's length limit / recommendation, Align transverse joints of roofing sheets.

5. Attach panels using manufacturer's job specific anchor clips and fasteners, spaced in accordance with manufacturer's instructions and code requirements to meet UL 90 assembly uplift requirements but no less than one anchor clip for each two square feet of roof area (16" O.C.).
6. At eaves and gable ends, terminate roofing by hooking over edge strip.
7. Finish standing seams at manufacturer's specified height. Bend and fold in accordance with manufacturer's instructions.
8. Fold lower ends of seams at eaves over at 45-degree angle.
9. Terminate standing seams at ridge and hips by turning down with tapered fold.
10. Valleys:
 - a. Form valleys of sheets not exceeding 10 feet in length.

- b. Lap joints 6 inches in direction of drainage.
- c. Extend valley sheet minimum 6 inches under roofing sheets.
- d. At valley, double fold valley and roofing sheets and secure with cleats spaced 18 inches OC.

3.4 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.
- B. Do not permit traffic over unprotected roof surface.

3.5 CLEANING

- A. Clean any grease, finger marks, or stains from panels per manufacturer's recommendations.

3.6 SCHEDULE

- A. Reference Drawings for location and details.
- B. Low-sloped building roof.

END OF SECTION

SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes flashings and counterflashings and fabricated sheet metal items.
 - 1. Provide reglets and accessories.
- B. Related Sections:
 - 1. Section 06 10 00 - Rough Carpentry: Wood blocking and battens for metal roofing substrate profiles.
 - 2. Section 07 42 13 - Metal Wall Panels
 - 3. Section 07 61 00 - Sheet Metal Roofing.
 - 4. Section 07 71 23 - Gutters and Downspouts.
 - 5. Section 07 90 00 - Joint Protection.
 - 6. Section 09 90 00 - Painting and Coating: Field painting.

1.2 REFERENCES

- 1. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
- B. ASTM International:
 - 1. ASTM A792 – Standard Specification for Steel Sheet, 55% Aluminum Zinc Alloy Coated by the Hot Dip Process.
- C. Federal Specification Unit:
 - 1. FS TT-C-494 - Coating Compound, Bituminous, Solvent Type, Acid Resistant.
- D. National Roofing Contractors Association:
 - 1. NRCA – Roofing and Waterproofing Manual.
- E. Sheet Metal and Air Conditioning Contractors:
 - 1. SMACNA - Architectural Sheet Metal Manual.

1.3 DESIGN REQUIREMENTS

- A. Sheet Metal Flashings: Reference drawings for specific detailing. Where specific details are not indicated, conform to typical detailing for condition indicated in SMACNA "Architectural Sheet Metal Manual." or NRCA Roofing and Waterproofing Manual.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- C. Product Data: Submit data on manufactured components metal types, finishes, and characteristics.
- D. Samples:
 - 1. After initial color selection by Architect, submit two samples, for final approval, 4x6

inch in size, minimum, illustrating metal finish color.

1.5 QUALIFICATIONS

- A. Fabricator and Installer: Company specializing in sheet metal work with minimum six years documented experience.

1.6 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- C. Prevent contact with materials causing discoloration or staining.

1.8 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

PART 2 PRODUCTS

2.1 SHEET METAL FLASHING AND TRIM

- A. Galvanized Steel: ASTM A653/A653M; structural steel sheet, G90 zinc coating; 0.024, 24-gauge inch thick steel.
- B. Pre-Finished Galvalume Steel Sheet: ASTM A792/A792M; structural steel sheet, AZ 50 or AZ 55 aluminum-zinc coating; 0.024, 24 gauge inch thick core steel, shop pre-coated with two coat fluoropolymer top coat; color to match surrounding and adjacent metal panels.

2.2 ACCESSORIES

- A. Fasteners: Stainless steel, with soft neoprene washers.
- B. Underlayment: ASTM D226; Type II, No. 30 unperforated asphalt felt.
- C. Slip Sheet: Rosin sized building paper.
- D. Primer: Zinc molybdate type.
- E. Protective Backing Paint: FS TT-C-494, Bituminous.
- F. Sealant: Silyl terminated Polyether sealant specified in Section 07 90 00.
- G. Plastic Cement: ASTM D4586, Type I.
- H. Reglets: Surface mounted type, galvanized steel, exposed ends covered with preformed caps, prefabricated corners at transitions; SM manufactured by Fry Reglet as design basis.

2.3 FABRICATION

- A. Form sections shape indicated on Drawings, accurate in size, square, and free from distortion or defects.
- B. Fabricate cleats of same material as sheet metal, interlocking with sheet.
- C. Form pieces in longest possible lengths.
- D. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- E. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- F. Fabricate corners from one piece with minimum 18-inch-long legs; seam for rigidity, seal with sealant.
- G. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.
- H. Seal metal joints.

2.4 FACTORY FINISHING

- A. Fluoropolymer Coating: Multiple coats as specified for sheet metal system, thermally cured, conforming to AAMA 2605.
- B. Washcoat: Finish concealed side of metal sheets with washcoat compatible with finish system, as recommended by finish system manufacturer.

PART 3 EXECUTION**3.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

- C. Verify roofing termination and base flashings are in place, sealed, and secure.

3.2 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Install surface mounted reglets to lines and levels indicated on Drawings. Seal top of reglets with sealant.
- C. Paint concealed metal surfaces with protective backing paint to minimum dry film thickness of 15 mil.

3.3 INSTALLATION

- A. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.
- B. Apply plastic cement compound between metal flashings and felt flashings.
- C. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- D. Seal metal joints watertight.

3.4 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspection will involve surveillance of Work during installation to ascertain compliance with specified requirements.

3.5 SCHEDULE

- A. Galvanized flashings: Concealed locations only.
- B. Pre-finished flashing: All visible fascia and trim to match surrounding and adjacent metal panel color.

END OF SECTION

SECTION 07 71 23
GUTTERS AND DOWNSPOUTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes pre-finished galvalume steel gutters, conductor heads, and downspouts.
 - 1. Provide precast concrete splash pads.
- B. Related Sections:
 - 1. Section 04 20 00 – Unit Masonry.
 - 2. Section 07 42 13 - Metal Wall Panels
 - 3. Section 07 61 00 - Sheet Metal Roofing.
 - 4. Section 07 62 00 - Sheet Metal Flashing and Trim.
 - 5. Section 07 90 00 - Joint Protection.
 - 6. Section 09 90 00 - Painting and Coating: Field painting of metal surfaces.

1.2 REFERENCES

- A. American Architectural Manufacturers Association:
 - 1. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
- B. ASTM International:
 - 1. ASTM A792 - Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
 - 2. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
- C. Federal Specification Unit:
 - 1. FS TT-C-494 - Coating Compound, Bituminous, Solvent Type, Acid Resistant.
- D. Sheet Metal and Air Conditioning Contractors:
 - 1. SMACNA - Architectural Sheet Metal Manual

1.3 DESIGN REQUIREMENTS

- A. Conform to applicable code for size and method of rainwater discharge. If sizes shown on drawings or called out, Contractor must verify conformance as noted above.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, locations, and installation details.
- C. Product Data: Submit data on manufactured components, materials, and finishes.
- D. Samples: Upon selection of color by Architect, submit two samples, 12-inch-long illustrating component design, finish, color, and configuration.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with SMACNA Manual.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope to drain.
- C. Prevent contact with materials during storage capable of causing discoloration, staining, or damage.

1.7 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

1.8 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish five-year manufacturer warranty for gutter and downspout finishes.

PART 2 PRODUCTS

2.1 GUTTERS AND DOWNSPOUTS

- A. Product Description:
 - 1. Gutters: Sheet metal; Square style profile.
 - 2. Downspouts: Sheet metal; Square style profile.
 - 3. Splash Pads: Precast concrete type, 12x24 inches; minimum 3000 psi at 28 days, with minimum 5 percent air entrainment.

2.2 COMPONENTS

- A. Pre-Finished Galvalume Steel Sheet: ASTM A792 aluminum-zinc coating; 24 gage core steel, shop pre-coated with PVDF (polyvinylidene fluoride) coating.

2.3 ACCESSORIES

- A. Anchors and Supports: Profiled to suit gutters and downspouts.
 - 1. Anchoring Devices: In accordance with SMACNA.
 - 2. Gutter Supports: Brackets and straps.
 - 3. Downspout Supports: Brackets and straps.
- B. Fasteners: Same material and finish as gutters and downspouts, with soft neoprene washers
- C. Protective Backing Paint: FS TT-C-494, bituminous.

2.4 FABRICATION

- A. Form gutters and downspouts of profiles and sizes indicated.
- B. Fabricate with required connection pieces.

- C. Form sections to shape indicated on Drawings, square, and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.
- D. Hem exposed edges of metal.
- E. Fabricate gutter and downspout accessories; seal watertight.

2.5 FACTORY FINISHING

- A. PVDF (polyvinylidene fluoride) coating: Multiple coat, thermally cured, fluoropolymer system conforming to AAMA 2605.
 - 1. Color: As selected by Architect from manufacturer's full color line to match existing.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

- B. Verify surfaces are ready to receive gutters and downspouts.

3.2 PREPARATION

- A. Paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to minimum dry film thickness of 15 mil.

3.3 INSTALLATION

- A. Sheet Metal: Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts and accessories.
- B. Set splash pads under downspouts. Secure in place.

3.4 SCHEDULE

- A. Refer to Drawings for additional information.

END OF SECTION

**SECTION 07 90 00
JOINT PROTECTION**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Preparing substrate surfaces.
 - 2. Sealant and joint backing.
- B. Related Sections:
 - 1. Section 03 30 00 – Cast-in-Place Concrete: Sealants in expansion joints.
 - 2. Section 04 20 00 – Unit Masonry.
 - 3. Section 06 10 00 – Rough Carpentry: Sheathing assemblies where sealant is required.
 - 4. Section 07 61 00 – Sheet Metal Roofing.
 - 5. Section 07 62 00 – Sheet Metal Flashing and Trim.
 - 6. Section 08 12 13.13 – Standard Hollow Metal Frames.
 - 7. Section 08 80 00 - Glazing: Glazing sealants and accessories.
 - 8. Section 09 21 16 - Gypsum Board Assemblies: Acoustic sealant.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM C510 – Standard Test Method for Staining and Color Change of Single or Multicomponent Joint Sealants.
 - 2. ASTM C711 – Standard Test Method for Low Temperature Flexibility and Tenacity of One Part, Elastomeric, Solvent Release Type Sealants.
 - 3. ASTM C834 - Standard Specification for Latex Sealants.
 - 4. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications.
 - 5. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
 - 6. ASTM C1193 - Standard Guide for Use of Joint Sealants.
 - 7. ASTM C1247 – Standard Test Method for Durability of Sealants Exposed to Continuous Immersion in Liquids.
 - 8. ASTM D1056 - Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
 - 9. ASTM D2240 – Standard Test Method for Rubber Property – Durometer Hardness.
 - 10. ASTM D3574 – Standard Test Methods for Flexible Cellular Materials – Slab, Bonded, and Molded Urethane Foams.
 - 11. ASTM E90 – Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
 - 12. ASTM E283 – Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtains walls, and Doors

- Under Specified Pressure Differences Across the Specimen.
- 13. ASTM E330 – Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- 14. ASTM E331 – Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
- B. California Department of Health Services:
 - 1. CA/DHS/EHLB/R-174 - Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- C. FDA Regulation CFR Title 21, Chapter 1, Subchapter B, Section177.2600 – Indirect Food Additives: Polymers – Rubber articles intended for repeated use.
- D. NSF/ANSI Standard 61 – Drinking Water System Components.
- E. South Coast Air Quality Management District:
 - 1. SCAQMD Rule 1168[**-January 7, 2005**] - Adhesive and Sealant Applications.
- F. Underwriters Laboratory:
 - 1. UL 2079 – Standard for tests for Fire Resistance of Building Joint Systems.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Products Data: Submit data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.
- C. Samples: Submit two samples, size illustrating sealant colors for selection.
- D. Manufacturer's Installation Instructions: Submit special procedures, surface preparation, and perimeter conditions requiring special attention.
- E. Warranty: Include coverage for installed sealants and accessories failing to achieve airtight seal, watertight seal, exhibit loss of adhesion or cohesion, and sealants which do not cure.

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform acoustical sealant application work in accordance with ASTM C919 and ASTM C1193, as appropriate to condition.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Applicator: Company specializing in performing Work of this section with minimum three years documented experience.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements.
- B. Maintain temperature and humidity recommended by sealant manufacturer during and after installation.

1.7 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate Work with sections referencing this section.

PART 2 - PRODUCTS**2.1 JOINT SEALERS**

- A. Sealant Type ES-A
 - 1. Multi-component polyurethane High Performance General Purpose Exterior (Nontraffic) Sealant.
 - a. ASTM C920 Type M
 - b. ASTM C920 Grades NS
 - c. ASTM C920 Class 25
 - d. ASTM C920 Exposure NT (non-traffic)
 - e. ASTM C920 Uses M, G, and A with O Joint substrates.
 - f. Color: black at thresholds, Colors as selected at other locations.
 - 2. Manufacturers:
 - a. Tremco - Dymeric FC
 - b. BASF Building Systems – Master Seal NP 2
 - c. Pecora – Dynatrol II
 - 3. Applications: Use for:
 - a. Control, expansion, and soft joints in masonry.
 - b. Joints between concrete and other materials.
 - c. Joints between metal frames, including doors, louvers, etc. and other materials at exterior/perimeter walls. Apply sealant on both exterior and interior sides of wall.
 - d. Under thresholds and window/storefront/curtainwall systems at floor slab to prevent air/water infiltration.
 - e. At intersections of dissimilar materials where infiltration of water or air is possible.
 - f. Perimeter joints of door and window frames or other framed openings in

- walls where there is no finished edge flange.
- g. Open Joints at penetrations through walls, and open joints at penetrations through concrete or gypsum board ceilings, where intended to be tight sealed joints
- h. Open joints between dissimilar materials where intended to be tight, sealed joints.
- i. Joints where edge trim of gypsum board abuts irregular surfaces or other surfaces and leaves an open joint.
- j. Within masonry system and at perimeter.
- k. Intersection of dissimilar materials which installations not uniform or where workmanship does not meet acceptable construction tolerances, when such workmanship is acceptable by the Architect.
- l. Metal Siding, louvers, fixtures and other penetrations in building enclosures not otherwise sealed weathertight. Unless noted otherwise provide continuous sealing perimeter joints and all other joints at exterior soffits.
- m. As sealant in roofing systems where a urethane sealant is not required by roofing manufacturer.
- n. Other exterior non-traffic joints for which no other sealant is indicated.
- o. Paintable.
- B. Sealant Type ES-B
 - 1. Single-component Neutral Curing Silicone Sealant.
 - a. ASTM C920 Grades S & NS
 - b. ASTM C920 Class 50
 - c. ASTM C920 NT (non traffic)
 - d. ASTM C920 Uses M, G, and A with substrates type O
 - e. Color: Colors as selected.
 - 2. Manufacturers:
 - a. Dow Chemical Company – Dowsil 795.
 - b. GE/Momentiv – SilPruf NB SCS9000.
 - c. Sonneborn – OmniSeal 50.
 - 3. Applications: Use for:
 - a. Exterior Aluminum Window Frames, storefront, and curtainwall to adjacent substrate, exterior and interior joints.
 - b. Within Glazing systems.
 - c. Do not paint.
- C. Sealant Type ES-C
 - 1. Single-component Acid Curing Silicone Sealant.
 - a. Mildew resistant.
 - b. ASTM C920 Grades S & NS
 - c. ASTM C920 Class 25
 - d. ASTM C920 NT (non traffic)
 - e. ASTM C920 Uses G, and A with substrates type O

- f. Color: Colors as selected.
- 2. Manufacturers:
 - a. Dow Corning Corporation – Dowsil 999A
 - b. GE/Momentiv – Sanitary SCS1700.
 - c. Pecora Corporation – 860.
 - d. Sonneborn – OmniPlus.
 - e. Tremco – Tremsil 200
- 3. Applications: Use for:
 - a. Joints between plumbing fixtures and floor and wall surfaces.
 - b. Joints between kitchen counter tops and wall surfaces.
- D. Sealant Type ES-D
 - 1. Multi-component Pourable Urethane High Performance Exterior Traffic Sealant.
 - a. ASTM C920 Grades M & P
 - b. ASTM C920 Class 25
 - c. ASTM C920 Exposure T (traffic) and NT (non-traffic).
 - d. ASTM C920 Uses M, G, and A with type O substrate joints.
 - e. Color: **[Colors as selected] [Grey]**.
 - 2. Manufacturers:
 - a. Tremco – THC—901.
 - b. BASF Building Systems – Masterseal SL 2.
 - c. Pecora – Dynatrol II-SG
 - 3. Applications: Use for:
 - a. Expansion joint in concrete construction that is principally horizontal in nature, including paving, sidewalks, curbs, etc. and where water immersion capability is required.
- E. Sealant Type AS-A
 - 1. Manufacturers:
 - a. Tremco - Tremflex 834
 - b. BASF Building System – NP 520
 - c. Pecora Corporation – AC-20 +Silicone.
 - 2. Single-component Siliconized Acrylic Latex Sealant.
 - a. ASTM C834: Sealant will effectively reduce airborne sound transmission through perimeter joints and opening in building construction as demonstrating by testing of representative assemblies in accordance with ASTM C834.
 - b. ASTM C834
 - c. Color: As selected.
 - 3. Applications: Use for:
 - a. Sealant bead between top stud runner and structure and between bottom stud track and floor.
 - b. Applications: Use for interior wall and ceiling control joints, joints between door and window frames and wall surfaces, and other interior joints for which no other type of sealant is indicated. Not for use at exterior walls.
 - c. Paintable.

2.2 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing:
 - 1. Pre-compressed foam sealer system, compatible with sealant;
 - a. Backerseal (Greyflex) manufactured by Emseal.
 - b. Open-cell polyurethane foam impregnated with anon-drying, water-based, stabilized, polymer-modified acrylic adhesive.
 - c. Sized per manufacturer for proper sealing of joint width.
 - d. Non-staining.
 - 2. Round foam rod compatible with sealant;
 - a. ASTM D1056, sponge or expanded rubber.
 - b. Oversized 30 to 50 percent larger than joint width.
 - c. Non-staining.
 - 3. Round elastomeric tubing compatible with sealant.
 - a. D1056 Neoprene, Butyl, or Silicone tubing.
 - b. Oversized 30 to 50 percent larger than joint width.
 - c. Non-staining.
 - d. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.
 - e. Non-staining.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify substrate surfaces and joint openings are ready to receive work.
- C. Verify joint backing and release tapes are compatible with sealant.

3.2 PREPARATION

- A. Remove loose materials and foreign matter impairing adhesion of sealant.
- B. Clean and prime joints.
- C. Perform preparation in accordance with ASTM C1193.
- D. Protect elements surrounding Work of this section from damage or disfiguration.

3.3 INSTALLATION

- A. Perform installation in accordance with ASTM C1193.
- B. Perform acoustical sealant application work in accordance with ASTM C919.

- C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- D. Tool butt joints concave. Tool fillet joints triangularly (straight not concave).

3.4 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.

- B. Clean adjacent soiled surfaces.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.
- B. Protect sealants until cured.

3.6 SCHEDULE

- A. Reference uses in sealant descriptions this specification and match sealant applied in field to uses listed.

END OF SECTION

DIVISION 8

OPENINGS

THE AGREEMENT, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, SUPPLEMENTARY CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, AND ALL ADDENDA ARE A PART OF THE CONTRACT. THE CONTRACTOR SHALL CONSULT THEM IN DETAIL FOR INSTRUCTIONS PERTAINING TO THE WORK. THE CONTRACTOR SHALL ALSO CONSULT ALL OTHER DIVISIONS AND SECTIONS OF THE PROJECT MANUAL, AND ALL DRAWINGS IN THE EXECUTION OF THE WORK OF THE CONTRACT.

THE CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, SYSTEMS, EQUIPMENT, ITEMS, ARTICLES, OPERATIONS, AND/OR METHODS LISTED, IMPLIED, MENTIONED, OR SCHEDULED IN THE CONTRACT DOCUMENTS AND/OR NECESSARY AND/OR REQUIRED FOR THE SATISFACTORY COMPLETION OF THE WORK.

THE LISTING OF WORK, REQUIREMENTS, AND PRODUCTS IN THIS SECTION IS NOT INTENDED TO BE CONCLUSIVE. THE CONTRACTOR SHALL CHECK ALL OTHER PARTS OF THE CONTRACT DOCUMENTS AND SHALL PROVIDE ALL MISCELLANEOUS ITEMS OF WORK AND PRODUCTS NECESSARY FOR THE SATISFACTORY COMPLETION OF THE WORK DESCRIBED IN THE CONTRACT DOCUMENTS.

**SECTION 08 12 13.13
STANDARD HOLLOW METAL FRAMES**

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes fire rated, non-rated, and acoustically insulated steel frames.
 - 1. Provide frames for interior and exterior doors.
 - 2. Provide frames for interior and exterior glazed lights.
- B. Related Sections:
 - 1. Section 04 20 00 - Unit Masonry: Masonry grout fill of metal frames and placement of anchors into masonry wall construction.
 - 2. Section 05 40 00 - Cold formed metal framing: Placement/anchoring in structural framed walls.
 - 3. Section 06 10 00 - Rough Carpentry: Placement and anchoring in framed walls and partitions.
 - 4. Section 07 21 16 - Blanket Insulation: Insulation to fill frame cavities at acoustic partitions.
 - 5. Section 08 13 13.13 - Standard Hollow Metal Doors.
 - 6. Section 08 14 16 - Flush Wood Doors.
 - 7. Section 08 71 00 - Door Hardware: Hardware, silencers, and weatherstripping.
 - 8. Section 08 80 00 - Glazing.

1.2 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
- B. ASTM International:
 - 1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- C. National Fire Protection Association:
 - 1. NFPA 80 - Standard for Fire Doors, Fire Windows.
 - 2. NFPA 105 - Standard for the Installation of Smoke Door Assemblies and other Opening Protectives.
 - 3. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.
- D. Underwriters Laboratories Inc.:
 - 1. UL 10B - Fire Tests of Door Assemblies.
 - 2. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
 - 3. UL 1784 - Air Leakage Tests of Door Assemblies.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate frame elevations, reinforcement, anchor types and spacing, location of cut-outs for hardware, and finish.

- C. Product Data: Submit frame configuration and finishes.
- D. Manufacturer's Installation Instructions: Submit special installation instructions.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Conform to requirements of ANSI A250.8.
- B. Fire Rated Frame Construction: Conform to one of the following:
 - 1. NFPA 252: with neutral pressure level at 40 inches maximum above sill at 5 minutes into test.
 - 2. UL 10C.
 - 3. 20-Minute Fire Rated Corridor and Smoke Barrier Frames where scheduled: Fire tested without hose stream test.
- C. Installed Fire Rated Frame Assembly: Conform to NFPA 80 for fire rated class same as fire door.
- D. Smoke and Draft Control Door Frames: Tested in accordance with UL 1784 and installed in accordance with NFPA 105.
 - 1. Air Leakage: Maximum 3.0 cfm/sf of door opening with 0.10-inch water gage pressure differential.
- E. Attach label from agency approved by authority having jurisdiction to identify each fire rated door frame.
 - 1. Attach smoke label to smoke and draft control door frames.
- F. Blast Resistance:
 - 1. Blast Load: Design and size glass to withstand blast load of 4 psi/28 psi-msec in accordance with ASTM F1642.
 - 2. All frames installed in exterior walls.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Accept frames on site in manufacturer's packaging. Inspect for damage.
- C. Break seal on-site to permit ventilation.

1.7 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate Work with frame opening construction, door, and hardware installation.
- C. Sequence installation to accommodate required door hardware electric wire connections as indicated in Section 08 71 00.

PART 2 PRODUCTS**2.1 STANDARD STEEL FRAMES**

- A. Manufacturers:
 - 1. Ceco Door Products.
 - 2. Curries.
 - 3. Republic Doors and Frames
 - 4. Steelcraft.
 - 5. Substitutions: Section 01 60 00 - Product Requirements.
- B. Product Description: Standard shop fabricated steel frames, fire rated and non-rated types.
 - 1. Frame Profiles:
 - a. Frames in interior masonry walls, existing opening, or other conditions where frame does not wrap drywall;
 - 1) Ceco – Series SQ.
 - 2) Curries – Masonry profile M equal rabbets.
 - 3) Republic – ME Series equal rabbeted.
 - 4) Steelcraft – F Series double equal rabbet.
 - 2. Interior Frames:
 - a. Level 1, nominal 18 gage/0.042-inch-thick material, base metal thickness.

2.2 ACCESSORIES

- A. Removable Stops at glazed frames: Rolled steel channel shape, mitered corners; prepared for countersink style tamper proof screws.
- B. Primer: ANSI A250.10 rust inhibitive type.
- C. Silencers: Resilient rubber set in fitted into drilled hole.
 - 1. Trimco 1229A or approved equal.
 - 2. Coordinate with Section 08 71 00.
- D. Weatherstripping: As specified in Section 08 71 00.
- E. Frame Anchors
 - 1. Wire Masonry Anchors, equal to Ceco WMA, at all locations where frame installed in new masonry wall.
 - 2. Existing Opening Anchors, equal to Ceco EO, at all existing masonry openings and existing openings in framed partitions where the gypsum panels are not being replaced.

2.3 FABRICATION

- A. Fabricate frames as follows:
 - 1. Exterior frames: Full profile welded unit.
 - 2. Interior frames in masonry: Face welded unit.
- B. Transom Bars for Glazed Lights: Fixed type, of same profiles as jamb and head.
- C. Fabricate frames with hardware reinforcement plates welded in place. Provide mortar guard boxes. Provide hardware reinforcement as follows:
 - 1. Hinges: 7 gauge.

- 2. Closers: 14 gauge.
- 3. Lock Strikes: 14 gauge.
- D. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.
- E. Prepare frames for silencers. Provide three single silencers for single doors on strike side. Provide two single silencers on frame head at double doors without mullions.
- F. Attach fire rated label to each fire rated frame.
- G. Fabricate frames to suit masonry wall coursing with 4-inch and 2-inch head members as indicated on Drawings.

2.4 SHOP FINISHING

- A. Steel Sheet: Galvanealed to ASTM A653/A653M A60.
- B. Primer: Baked.
- C. Factory Finish: Baked prime paint over phosphatized steel.

PART 3 EXECUTION**3.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify opening sizes and tolerances are acceptable.

3.2 INSTALLATION

- A. Install frames in accordance with ANSI A250.8.
- B. Coordinate with masonry, gypsum board, and concrete wall construction for anchor placement.
- C. Coordinate installation of glass and glazing specified in Section 08 80 00.
- D. Coordinate installation of frames with installation of hardware specified in Section 08 71 00 and doors in Section 08 13 13.13, 08 14 16.
- E. Install roll formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.
- F. Install mineral wool sound batt insulation in door frame to fill all crevices at all framed sound rated partitions and where sound rated doors are scheduled.

3.3 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Diagonal Distortion: 1/16 inch measured with straight edges, crossed corner to corner.

3.4 SCHEDULE

- A. Refer to Door and Frame Schedule in Drawings for additional information.

END OF SECTION

SECTION 08 13 13.13
STANDARD HOLLOW METAL DOORS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes non-rated, thermally insulated, and acoustic steel doors.
- B. Related Sections:
 - 1. Section 08 12 13.13 - Standard Hollow Metal Frames.
 - 2. Section 08 71 00 - Door Hardware.
 - 3. Section 08 80 00 - Glazing: Glass for doors.
 - 4. Section 09 90 00 - Painting and Coating: Field painting of doors.

1.2 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
- B. ASTM International:
 - 1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. ASTM C1363 - Standard Test Method for the Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
 - 3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 4. ASTM E413 - Classification for Rating Sound Insulation.
- C. Hollow Metal Manufacturers Association:
 - 1. HMMA 800 – 850 Series Documents.
- D. National Fire Protection Association:
 - 1. NFPA 80 - Standard for Fire Doors, Fire Windows.
 - 2. NFPA 105 - Standard for the Installation of Smoke Door Assemblies and other Opening Protectives.
 - 3. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.
- E. Steel Door Institute:
 - 1. SDI 108 - Recommended Selection and Usage Guide for Standard Steel Doors.
- F. Underwriters Laboratories Inc.:
 - 1. UL 10B - Fire Tests of Door Assemblies.
 - 2. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
 - 3. UL 1784 - Air Leakage Tests of Door Assemblies.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Indicate door elevations, internal reinforcement, closure method, and cut-outs for glazing.
- C. Product Data: Submit door configurations, location of cut-outs for hardware reinforcement.

- D. Manufacturer's Installation Instructions: Submit special installation instructions.
- E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ANSI A250.8.
- B. Meet fabrication methods and product quality standards set by the Hollow Metal Manufacturers Association, HMMA, a division of the National Association of Architectural Metal Manufacturers, NAAMM, as set forth in the contract documents and NAAMM's HMMA 800 through 850 Series documents.
- C. Fire Rated Door Construction: Conform to one of the following:
 - 1. NFPA 252: with neutral pressure level at 40 inches maximum above sill at 5 minutes into test.
 - 2. UL 10C.
- D. Installed Fire Rated Door Assembly: Conform to NFPA 80 for fire rated class as indicated on Drawings.
- E. Attach label from agency approved by authority having jurisdiction to identify each fire rated door.
- F. Surface Burning Characteristics:
 - 1. Foam Insulation: Maximum 75/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- G. Apply label from agency approved by authority having jurisdiction to identify each foam plastic insulation board.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years' experience.
- B. Installer: Company specializing in performing work of this section with minimum three years' experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept doors on site in manufacturer's packaging. Inspect for damage.
- C. Break seal on site to permit ventilation.

1.7 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate Work with door opening construction, door frame, and door hardware installation.
- C. Coordinate installation to accommodate door hardware electric wire connections.

PART 2 PRODUCTS**2.1 STANDARD STEEL DOORS**

- A. Manufacturers: Rated and non-rated doors, insulated/composite.
 - 1. Ceco Door Products: Imperial
 - 2. Curries – 707 Series - Composite
 - 3. Republic Doors and Frames: DE Series
 - 4. Steelcraft – L Series
 - 5. Substitutions: Section 01 60 00 - Product Requirements.
- B. Product Description:
 - 1. Doors: ANSI A250.8, SDI 108, 1-3/4 inch thick.
 - a. Level 1 - Standard Duty, Model 2, seamless design, 20 ga.

2.2 COMPONENTS

- A. Face: Steel sheet in accordance with ANSI A250 and SDI 108.
- B. End Closure: Channel, 0.053 inches thick, inverted.
- C. Core: polyurethane.
- D. Thermal Insulated Door: Total insulation minimum R-Value of 10 measured in accordance with ASTM C1363.
- E. Sound Rated Door: STC of 42 min., measured in accordance with ASTM E413.

2.3 ACCESSORIES

- A. Door Glazing:
 - 1. Glass: As specified in Section 08 80 00.
 - 2. Glazing Stops: Rolled steel channel shape, mitered corners; prepared for countersink style tamper proof screws.
- B. Primer: ANSI A250.10 rust inhibitive type.

2.4 FABRICATION

- A. Fabricate doors with hardware reinforcement welded in place. Provide mortar/plaster guard boxes. Provide reinforcement as follows:
 - 1. Hinges: 7 gauge minimum
 - 2. Closers: 14 gauge minimum

- 3. Exit Devices: 14 gauge minimum
- 4. Kick plates: 14 gauge minimum

2.5 SHOP FINISHING

- A. Steel Sheet: Galvanealed to ASTM A653/A653M A60 as scheduled.
- B. Primer: Baked.

PART 3 EXECUTION**3.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify opening sizes and tolerances are acceptable.

3.2 INSTALLATION

- A. Install doors in accordance with ANSI A250.8.
- B. Install door louvers, plumb and level.
- C. Coordinate installation of glass and glazing specified in Section 08 80 00.
- D. Coordinate installation of doors with installation of frames specified in Section 08 12 13.13 and hardware specified in Section 08 71 00.
- E. Touch-up damaged shop finishes.

3.3 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.4 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for adjusting.
- B. Adjust door for smooth and balanced door movement.

3.5 SCHEDULE

- A. Refer to Door and Frame Schedule in Drawings for additional information.

END OF SECTION

**SECTION 08 14 16
FLUSH WOOD DOORS**

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Flush wood doors.
- B. Related Requirements:
 - 1. Section 08 12 13.13 - Standard Hollow Metal Frames.
 - 2. Section 08 71 00 - Door Hardware.
 - 3. Section 08 80 00 - Glazing.

1.2 REFERENCE STANDARDS

- A. American National Standards Institute:
 - 1. ANSI A135.4 - Basic Hardboard.
- B. ASTM International:
 - 1. ASTM C1048 - Standard Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.
 - 2. ASTM E413 - Classification for Rating Sound Insulation.
- C. Architectural Woodwork Institute:
 - 1. AWI AWS - Architectural Woodwork Standards.
- D. Consumer Products Safety Commission:
 - 1. CPSC 16 CFR 1201 - Safety Standard for Architectural Glazing.
- E. Forest Stewardship Council:
 - 1. FSC Guidelines - Forest Stewardship Council Guidelines.
- F. Hardwood Plywood and Veneer Association:
 - 1. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood.
- G. Wood Window and Door Manufacturers Association:
 - 1. WDMA I.S 1A - Architectural Wood Flush Doors.

1.3 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate Work with door opening construction, door frame and door hardware installation.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data:
 - 1. Submit data for door core materials and construction.
 - 2. Submit data for veneer species, type and characteristics.
 - 3. Submit data for factory finishes.
- C. Shop Drawings:
 - 1. Indicate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, and factory machining criteria.
- D. Samples:

- 1. Submit two sample chains of door veneer, 3x5 inch minimum in size illustrating wood grain, stain color, and sheen.
- E. Manufacturers' Instructions: Submit special installation instructions.
- F. Qualification Statements: Submit manufacturer experience qualifications.
- G. Perform Work in accordance with AWI AWS Section 9, Custom Grade.
- H. Finish doors in accordance with AWI AWS Section 5 Custom Grade.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' experience.
- B. Installer: Company specializing in performing work of this section with minimum three years' experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer when stored more than one week.
- C. Accept doors on site in manufacturer's packaging. Inspect for damage.
 - 1. Break seal on site to permit ventilation.

1.7 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.
- C. Interior Doors:
 - 1. Factory Finished Doors: Furnish manufacturer's life of installation warranty.
 - 2. Field Finished Doors: Furnish manufacturer's life of installation warranty.

PART 2 PRODUCTS

2.1 FLUSH WOOD DOORS

- A. Manufacturer List:
 - 1. VT Industries as basis of design.
 - 2. AMPCO Products, LLC.
 - 3. ASSA ABLOY
 - 4. Eggers Industries.
 - 5. Masonite.
 - 6. Vancouver Architectural Doors.

7. Section 01 60 00 - Product Requirements: Requirements for substitutions for other manufacturers and products.
- B. Flush Interior Doors: Solid core non-rated and 20-minute fire rated doors.
 1. Thickness: 1-3/4 inches
 2. Core: Urea free and FSC PC.
 3. Face Construction: Five ply.
 - a. Wood-based composite crossbanding.
 - b. White Birch veneer plain sliced book matched.
 4. Performance Duty Level: Heavy duty and Extra heavy duty as scheduled.
 5. Quality Grade: AWI AWS Custom.
 6. Performance Duty Level: WDMA I.S. 1A.

2.2 MATERIALS

- A. Door Cores: AWI AWS Section 9.
 1. Solid Core, Non-Fire Rated and 20 Minute Fire Rated:
 - a. Type: PC; urea-free FSC particleboard or agrifiber, ANSI A208.1 grade LD-2.
- B. Interior Door Faces:
 1. Transparent Finished Faces: Wood veneer.
 - a. Species: Select white birch.
 - b. Veneer Cut: Plain sliced.
 - c. Veneer Matching: Book matched.
 - d. Face Matching: Balanced. Pair match multiple door leaves in single opening.
- C. Cross Banding Behind Wood Veneer: One ply; wood fiber-based composite.
- D. Top and Bottom Rail:
 1. 2 5/8" minimum wide hardwood rail.
- E. Stiles:
 1. 1 3/4" wide hardwood stile.
- F. Facing Adhesive: Type II – water resistant.

2.3 FABRICATION

- A. Fabricate doors in accordance with AWI AWS Section 9 requirements.
- B. Furnish lock blocks at lock edge, across face of door for panic devices and kick plates, top of door for closer, and for reinforcement of hardware specified.
- C. Vertical Exposed Edge of Stiles: Hardwood stained and lacquered to match door facing.
- D. Fit door edge trim to edge of stiles after applying veneer facing.
- E. Bond edge banding to cores.
- F. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware. Furnish solid blocking for through bolted hardware.
- G. Factory fit doors for frame opening dimensions identified on shop drawings.
- H. Provide edge clearances in accordance with AWI AWS Section 9.

2.4 FINISHES

- A. Finish work in accordance with AWI AWS Section 5; Custom Grade.
- B. Transparent Finish System: Stained, color as selected; sheen as selected.
 1. System 9; UV curable epoxy, polyester, urethane.
- C. Seal door top edge with sealer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.2 INSTALLATION

- A. Install doors in accordance with AWI AWS Section 9 and manufacturer's instructions.
- B. Field Fitting and Trimming:
 1. Trim non-rated door width by cutting equally on both jamb edges.
 2. Trim door height by cutting bottom edges to maximum of 3/4 inch.
 - a. Trim fire door height at bottom edge only, in accordance with fire rating requirements.
- C. Coordinate installation of doors with installation of frames specified in Section 08 12 13.13 08 41 13 and hardware specified in Section 08 71 00.
- D. Coordinate installation of glass and glazing specified in Section 08 80 00.

3.3 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Conform to AWI AWS Section 9 requirements for the following:
 1. Fit and clearance tolerances.
 2. Gaps.
 3. Flushness.
 4. Flatness.
 5. Squareness.

3.4 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for starting and adjusting.
- B. Adjust door for smooth and balanced door movement.
- C. Adjust door closer for full closure.

3.5 SCHEDULE

- A. Refer to Door and Frame Schedule in drawings for more information.

END OF SECTION

**SECTION 08 33 00
INSULATED ROLLING SERVICE DOORS**

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Electric operated overhead insulated rolling doors.
- B. Related Sections:
 - 1. 05 50 00 Metal Fabrications - Door opening jamb and head members.
 - 2. 06 10 00 Rough Carpentry - Door opening jamb and head members.
 - 3. 09 91 00 Painting - Field painting.
 - 4. Division 26. Electrical wiring and conduit, fuses, disconnect switches, connection of operator to power supply, and installation of control station and wiring.
- C. Products That May Be Supplied, But Are Not Installed Under This Section: Control Station.

1.2 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Wind Loading: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall to design pressures that meet or exceed the Windstorm Standards for this area. The product used must meet the wind loads indicated on the structural drawings.
 - 2. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.
 - 3. Cycle Life: Design doors of standard construction for normal use of up to 20 cycles per day maximum.
 - 4. Insulated Door Slat Material Requirements:

- a. Flame Spread Index of 0 and a Smoke Developed Index of 10 as tested per ASTM E84.
- b. Minimum Sound Transmission Class (STC) rating of 26 as tested per ASTM E90.
- c. Minimum R-value of 8.0 (U-factor of 0.125) as calculated using the ASHRAE Handbook of Fundamentals.
- d. Insulation to be CFC Free with an Ozone Depletion Potential (ODP) rating of zero.

1.3 SUBMITTALS

- A. Reference Section 01 33 00 Submittal Procedures; submit the following items:
 - 1. Product Data: Manufacturer's data sheets on each product to be used, including:
 - a. Preparation Instructions and recommendations.
 - b. Storage and handling requirements.
 - c. Details of construction and fabrication.
 - d. Installation Instructions.
 - 2. Shop Drawings: Include detailed plans, elevations, details of framing members, anchoring methods, required clearances, hardware, and accessories. Include relationship with adjacent construction.
 - 3. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
 - 4. Closeout Submittals:
 - a. Operation and Maintenance Manual.
 - b. Manufacturer's Certificate stating that installed materials meet or exceed this specification.

1.4 QUALITY ASSURANCE

- A. Qualifications:

1. Manufacturer Qualifications: Minimum of five years' experience in producing doors of the type specified.
2. Installer Qualifications: Minimum three years' specializing in performing Work of this section and approved by manufacturer.

1.5 DELIVERY STORAGE AND HANDLING

- A. Reference Section 01 66 00 Product Storage and Handling Requirements.
- B. Follow manufacturer's instructions.

1.6 WARRANTY

- A. Standard Warranty: Two years from date of shipment against defects in material and workmanship.
- B. Maintenance: Submit for owner's consideration and acceptance of a maintenance service agreement for installed products.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Basis of Design: Model CESD20; Clopay Building Products Co.; Mason, OH 45040-3101; Telephone: (800) 282-2260.
- B. Overhead Door Corporation; Stormtite Insulated Service Door; Model 625.
- C. Substitutions: Reference Section 01 25 13 Product Substitution Procedures.

2.2 MATERIALS

- A. Curtain:
 1. Slat Material: No. 6F, (Listed Exterior/Interior):
 - a. Galvanized Steel / Galvanized Steel: 24 / 24 gauge, Grade 40, ASTM A 653 galvanized steel zinc coating.
 - b. Insulation: 7/8 inch (22 mm) foamed-in-place, closed cell urethane.
 - c. Total Slat Thickness: 15/16 inch (24 mm).
 - d. Slats have a Flame Spread Index of 0 and a Smoke Developed Index of 10 as tested per ASTM E84.
 - e. Slat has an R-value of 8.0 and an STC rating of 26.
 2. Bottom Bar: Reinforced extruded aluminum interior face with full

- depth insulation and exterior skin slat to match curtain material and gauge.
3. Fabricate interlocking sections with high strength nylon end-locks on alternate slats each secured with two 1/4" (6.35 mm) rivets. Provide windlocks as required to meet specified wind load.
4. Exterior Slat Finish: GalvaNex™ Coating System and phosphate treatment followed by baked-on polyester powder coat, color as selected by Architect from manufacturer's standard color range, minimum 32 colors; minimum 2.5 mils (0.065 mm) cured film thickness; ASTM D-3363 pencil hardness: H or better.
5. Interior Slat Finish: GalvaNex™ Coating System and phosphate treatment followed by baked-on polyester powder coat, color as selected by Architect from manufacturer's standard color range, minimum 32 colors; minimum 2.5 mils (0.065 mm) cured film thickness; ASTM D-3363 pencil hardness: H or better.
6. Curtain Configuration: Standard Curtain configuration.
7. Bottom Bar Finish:
 - a. Exterior Face: Match slats.
 - b. Interior Face: Powder coat to match slats.
8. Bottom Bar Configuration: Standard Bottom Bar Configuration.
- B. Guides: Fabricate with minimum 3/16 inch (4.76 mm) structural steel angles. Provide windlock bars of same material when windlocks are required to meet specified wind load. Top of inner and outer guide angles to be flared outwards to form bellmouth for smooth entry of curtain into guides. Provide removable guide stoppers to prevent over travel of curtain and bottom bar. Top 16-1/2" (419.10 mm) of coil side guide angles to be removable for ease of curtain

installation and as needed for future curtain service.

1. Finish: Steel: Phosphate treatment followed by a light gray baked-on polyester powder coat; minimum 2.5 mils (0.065 mm) cured film thickness.
 2. Configuration: Standard Guide Configuration.
- C. Counterbalance Shaft Assembly:
1. Barrel: Steel pipe capable of supporting curtain load with maximum deflection of 0.03 inches per foot (2.5 mm per meter) of width.
 2. Spring Balance: Oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door to ensure that maximum effort to operate will not exceed 25 lbs (110 N). Provide wheel for applying and adjusting spring torque.
- D. Brackets: Fabricate from minimum 3/16-inch (5 mm) steel plate with permanently lubricated ball or roller bearings at rotating support points to support counterbalance shaft assembly and form end closures.
1. Finish: Steel: Phosphate treatment followed by a light gray baked-on polyester powder coat; minimum 2.5 mils (0.065 mm) cured film thickness.
- E. Hood: 24-gauge galvanized steel with reinforced top and bottom edges. Provide minimum 1/4-inch (6.35 mm) steel intermediate support brackets as required to prevent excessive sag.
1. Finish: GalvaNex™ Coating System and phosphate treatment followed by baked-on polyester powder coat, color as selected by Architect from manufacturer's standard color range, minimum 32 colors; minimum 2.5 mils (0.065 mm) cured film thickness; ASTM D-3363 pencil hardness: H or better.
- F. Weatherstripping:
1. Bottom Bar, Motor Operated Doors: Weather/sensing edge with neoprene or rubber astragal

extending full width of door bottom bar.

2. Guides: Replaceable vinyl strip on guides sealing against fascia side of curtain.
3. Lintel Seal: Nylon brush seal fitted at door header to impede air flow.
4. Hood: Neoprene/rayon baffle to impede air flow above coil.

2.3 ACCESSORIES

- A. Locking:
1. Crank Hoist: Padlockable slide bolt on coil side of bottom bar at each jamb extending into slots in guides.
- B. Operator and Bracket Mechanism Cover: Provide 24-gauge galvanized steel sheet metal cover to enclose exposed moving operating components at coil area of unit. Finish to match door hood.

2.4 OPERATION

- A. Supply ClopayModel MG, industrial duty - rated for a maximum of 20 cycles per hour, UL listed, Totally Enclosed Non Ventilated gear head operator(s) rated (1/3) (1/2) or (3/4) hp as recommended by door manufacture for size and type of door, ___Volts, ___Phase. Provide complete with electric motor and factory pre-wired motor control terminals, maintenance free solenoid actuated brake, emergency manual chain hoist and control station(s). Motor shall be high starting torque, industrial type, protected against overload with an auto-reset thermal sensing device. Primary speed reduction shall be heavy-duty, lubricated gears with mechanical braking to hold the door in any position. Operator shall be equipped with an emergency manual chain hoist assembly that safely cuts operator power when engaged. A disconnect chain shall not be required to engage or release the manual chain hoist. Operator drive and door driven sprockets shall be provided with #50 roller chain. Provide an integral Motor Mounted Interlock system to

prevent damage to door and operator when mechanical door locking devices are provided. Operator shall be capable of driving the door at a speed of 8 to 9 inches per second (20 to 23 cm/sec). Fully adjustable, driven linear screw type cam limit switch mechanism shall synchronize the operator with the door. The electrical contractor shall mount the control station(s) and supply the appropriate disconnect switch, all conduit and wiring per the overhead door wiring instructions.

1. Control Station: Surface mounted, "Open/Close/Stop" push buttons; NEMA 1.
- B. Weather/Sensing Edge: Provide automatic reversing control by an automatic sensing switch within neoprene or rubber astragal extending full width of door bottom bar.
 1. Provide an electric sensing edge device. Contact before door fully closes shall cause door to immediately stop downward travel and reverse direction to the fully opened position. Provide a self-monitoring wireless sensing edge connection to motor operator eliminating the need for a physical traveling electric cord connection between bottom bar sensing edge device and motor operator. Supervised system alters normal door operation preventing

damage, injury or death due to an inoperable sensing edge system.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates upon which work will be installed and verify conditions are in accordance with approved shop drawings.
- B. Coordinate with responsible entity to perform corrective work on unsatisfactory substrates.
- C. Commencement of work by installer is acceptance of substrate.

3.2 INSTALLATION

- A. General: Install door and operating equipment with necessary hardware, anchors, inserts, hangers and supports.
- B. Follow manufacturer's installation instructions.

3.3 ADJUSTING

- A. Following completion of installation, including related work by others, lubricate, test, and adjust doors for ease of operation, free from warp, twist, or distortion.

3.4 CLEANING

- A. Clean surfaces soiled by work as recommended by manufacturer.
- B. Remove surplus materials and debris from the site.

3.5 DEMONSTRATION

- A. Demonstrate proper operation to Owner's Representative.
- B. Instruct Owner's Representative in maintenance procedures.

END OF SECTION

SECTION 08 71 00
DOOR HARDWARE

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes hardware for wood and steel doors.
 - 1. Provide door gaskets, including weatherstripping and seals, and thresholds.
- B. Related Sections:
 - 1. Section 08 12 14 - Standard Steel Frames: Silencers integral with steel frames.
 - 2. Section 08 13 14 - Standard Steel Doors.
 - 3. Section 08 14 16 - Flush Wood Doors.
 - 4. Section 08 33 23 - Overhead Coiling Doors.
 - 5. Section 13 34 19 - Metal Building Systems.

1.2 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI A156.1 - Butts and Hinges.
 - 2. ANSI A156.2 - Bored and Preassembled Locks and Latches.
 - 3. ANSI A156.3 - Exit Devices.
 - 4. ANSI A156.4 - Door Controls - Closures.
 - 5. ANSI A156.5 - Auxiliary Locks and Associated Products.
 - 6. ANSI A156.7 - Template Hinge Dimensions.
 - 7. ANSI A156.8 - Door Controls - Overhead Holders.
 - 8. ANSI A156.12 - Interconnected Locks and Latches.
 - 9. ANSI A156.13 - Mortise Locks and Latches.
 - 10. ANSI A156.14 - Sliding and Folding Door Hardware.
 - 11. ANSI A156.15 - Closer Holder Release Devices.
 - 12. ANSI A156.16 - Auxiliary Hardware.
 - 13. ANSI A156.18 - Materials and Finishes
- B. Builders Hardware Manufacturers Association:
 - 1. BHMA Directory of Certified Products.
- C. National Fire Protection Association:
 - 1. NFPA 80 - Standard for Fire Doors, Fire Windows.
 - 2. NFPA 101 - Life Safety Code
 - 3. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.
- D. Underwriters Laboratories Inc.:
 - 1. UL 10B - Fire Tests of Door Assemblies.
 - 2. UL 305 - Panic Hardware.
 - 3. UL - Building Materials Directory.
- E. Intertek Testing Services (Warnock Hersey Listed):
 - 1. WH - Certification Listings.

1.3 PERFORMANCE REQUIREMENTS

- A. Fire Rated Openings: Provide door hardware listed by UL or Intertek Testing Services (Warnock Hersey Listed), or other testing laboratory approved by applicable authorities.

- 1. Hardware: Tested in accordance with NFPA 252.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit manufacturer information, including electrical characteristics and connection requirements.
- C. Shop Drawings:
 - 1. Indicate locations and mounting heights of each type of hardware, schedules, catalog cuts.
 - 2. Submit manufacturer's parts lists, and templates.
- D. Manufacturer's Installation Instructions: Submit special procedures, and perimeter conditions requiring special attention.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of installed cylinders and their master key code.
- C. Operation and Maintenance Data: Submit data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
- D. Keys: Deliver with identifying tags to Owner by security shipment direct from hardware supplier.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with the following requirements:
 - 1. ANSI A156 series.
 - 2. NFPA 80.
 - 3. UL 305.
- B. Furnish hardware marked and listed in BHMA Directory of Certified Products.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Hardware Supplier: Company specializing in supplying commercial and institutional door hardware with minimum three years documented experience and approved by primary hardware manufacturers.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., as suitable for purpose specified and indicated.

1.8 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.
- C. Include persons involved with installation of doors, frames, and hardware.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Package hardware items individually with necessary fasteners, instructions, and installation templates, when necessary; label and identify each package with door opening code to match hardware schedule.

1.10 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate Work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware and recessed items.
 - 1. Provide templates or actual hardware as required to ensure proper preparation of doors and frames.
- C. Sequence installation to accommodate required utility connections.
- D. Coordinate Owner's keying requirements during course of Work.

1.11 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish minimum one-year manufacturer warranty from the date of substantial completion for all hardware components specified in this section, unless noted otherwise this section. If manufacturer's standard term of warranty exceeds this, provide manufacturer's standard term. Coverage will include repair and replacement of all hardware at no charge to the Owner due to manufacturer defect or improper installation.
- C. Furnish minimum ten-year manufacturer warranty from the date of substantial completion for door closers specified in this section. If manufacturer's standard term of warranty exceeds this, provide manufacturer's standard term.
- D. Furnish minimum five-year manufacturer warranty from the date of substantial completion for panic hardware specified in this section. If manufacturer's standard term of warranty exceeds this, provide manufacturer's standard term.

1.12 MAINTENANCE MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Maintenance materials.
- B. Furnish special wrenches and tools applicable for each different and for each special hardware component.
- C. Furnish maintenance tools and accessories supplied by hardware component manufacturer.

1.13 EXTRA MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Furnish ten extra key lock cylinders for each master keyed group.

PART 2 PRODUCTS**2.1 DOOR HARDWARE**

- A. Manufacturers:
 - 1. ABH – www.abhmfg.com
 - 2. Assa – www.assalock.com
 - 3. Best Access Systems – www.bestaccess.com
 - 4. Bommer Industries, Inc. – www.bommer.com
 - 5. Corbin-Russwin – www.corbinrusswin.com
 - 6. Falcon – www.falconlock.com
 - 7. Glynn-Johnson – www.glynn-johnson.com
 - 8. Hager Companies – www.hagerco.com
 - 9. Ives – professional.iveshardware.com
 - 10. KABA Ilco – www.kaba-ilco.com
 - 11. Kaba Mas – www.mas-hamilton.com
 - 12. LCN Closers – www.lcnclosers.com
 - 13. Medeco – www.medeco.com
 - 14. National Guard Products – www.ngpinc.com
 - 15. PC Henderson – www.pchendersdon.com
 - 16. Pemko – www.pemko.com
 - 17. Precision Hardware – www.precisionhardware.com
 - 18. Rixson – www.rixson.com
 - 19. Sargent – www.sargentlock.com
 - 20. Sargent and Greenleaf – www.sargentandgreenleaf.com
 - 21. Schlage Lock Co. – www.schlage.com
 - 22. Trimco – www.trimcobbw.com
 - 23. Von Duprin, Inc. – www.vonduprin.com
 - 24. Substitutions: Section 01 60 00 - Product Requirements.
- B. Hinge Manufacturers:
 - 1. Hager.
 - 2. Ives.
 - 3. ABH.
 - 4. Bommer.
 - 5. Substitutions: Section 01 60 00 - Product Requirements.
- C. Lockset, Latch Set, and Cylinder Manufacturers:
 - 1. Schlage, ND and L, Sparta lever style, as design basis.

2. Falcon.
 3. Sargent.
 4. Best.
 5. Substitutions: Section 01 60 00 - Product Requirements.
- D. Exit Device Manufacturers:
1. Von Duprin, Series 33 as design basis.
 2. Precision.
 3. Sargent.
 4. Substitutions: Section 01 60 00 - Product Requirements.
- E. Cylinder Manufacturers:
1. Schlage, Conventional as design basis.
 2. Falcon.
 3. Sargent.
 4. Best.
 5. ASSA.
 6. Medeco.
 7. Substitutions: Section 01 60 00 - Product Requirements.
- F. Closers Manufacturers:
1. Falcon, SC70 as design basis.
 2. LCN.
 3. Falcon.
 4. Norton.
 5. Corbin-Russwin.
 6. Substitutions: Section 01 60 00 - Product Requirements.
- G. Door Controls and Overhead Holders Manufacturers:
1. Glynn Johnson.
 2. Rixson.
 3. ABH.
 4. Substitutions: Section 01 60 00 - Product Requirements.
- H. Push/Pulls, Protection Plates, Gaskets, Thresholds, and Trim Manufacturers:
1. Ives.
 2. Hager.
 3. National Guard Products
 4. Pemko.
 5. Trimco/BBW.
 6. ABH.
 7. Substitutions: Section 01 60 00 - Product Requirements.

2.2 COMPONENTS

- A. General Hardware Requirements: Where not specifically indicated, comply with applicable ANSI A156 standard for type of hardware required. Furnish each type of hardware with accessories as required for applications indicated and for complete, finished, operational doors.
1. Templates: Furnish templates or physical hardware items to door and frame manufacturers sufficiently in advance to avoid delay in Work.
 2. Reinforcing Units: Furnished by door and frame manufacturers; coordinated by

- hardware supplier or hardware manufacturer.
3. Fasteners: Furnish as recommended by hardware manufacturer and as required to secure hardware.
 - a. Finish: Match hardware item being fastened.
 4. Fire Ratings: Provide hardware with UL or Intertek Testing Services (Warnock Hersey Listed) listings for type of application involved.
 5. Electrical Devices: Make provisions and coordinate requirements for electrical devices and connections for hardware.
- B. Hinges: ANSI A156.1, full mortise type, template type, ANSI A156.7, complying with following general requirements unless otherwise scheduled.
1. Widths: Sufficient to clear trim projection when door swings 180 degrees.
 2. Number: Furnish minimum three hinges to 90 inches high, four hinges to 120 inches high for each door leaf.
 - a. Fire Rated Doors To 86 inches High: Minimum three hinges.
 3. Size and Weight: 4-1/2-inch heavy weight typical for 1-3/4-inch doors.
 - a. Doors Over 40 inches Wide: Extra heavy weight ball or oilite bearing hinges.
 - b. Doors 1-3/8-inch-Thick: 3-1/2-inch size.
 - c. Doors 2-inch-Thick: 5 inch extra heavy weight ball or oilite bearing.
 - d. Doors Over 48 inches Wide: 5 inch extra heavy weight ball or oilite bearing.
 4. Pins: Furnish nonferrous hinges with non-removable pins (NRP) at exterior and locked outswinging doors, non-rising pins at interior doors.
 5. Tips: Flat button with Flush tips.
- C. Locksets: Furnish locksets compatible with specified cylinders. Typical 2-3/4-inch backset. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt verify type of cutouts provided in metal frames.
1. Mortise Locksets: ANSI A156.13, Series 1000, Grade 1 unless otherwise indicated.
 2. Bored (Cylindrical) Locksets: ANSI A156.2, Series 4000, Grade 1 unless otherwise indicated.
 3. Interconnected Locksets: ANSI A156.12, Series 5000, Grade 1 unless otherwise indicated.
 4. Auxiliary Locksets: ANSI A156.5, Grade 1, [mortise dead locks] [bored dead locks] [rim locks] [narrow stile locks] unless otherwise indicated.
- D. Latch Sets: Match locksets. Typical 2-3/4-inch backset. Furnish standard strikes with extended lips to protect trim from being marred by latch

bolt verify type of cutouts provided in metal frames.

1. Mortise Latch Sets: ANSI A156.13, Series 1000, Grade 1 unless otherwise indicated.
 2. Bored (Cylindrical) Latch Sets: ANSI A156.2, Series 4000, Grade 1 unless otherwise indicated.
- E. Exit Devices: ANSI A156.3, Grade 1 rim type as scheduled, with cross bar, unless otherwise indicated. All exit devices shall be UL listed for Accident Hazard or Fire Exit Hardware.
1. Types: Suitable for doors requiring exit devices.
 2. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt verify type of cutouts provided in metal frames, with dust-proof floor strikes.
 3. Provide latch guards.
 4. Coordinators: Furnish overhead type at pairs of doors.
 5. All exit devices scheduled for two-way operation shall have electric latch retraction whose operation shall be by centralized control panel supplied and installed by others.
 6. All exit devices scheduled for exit only operation shall have signal switch with necessary switches to provide connection to a security console.
 7. Push Pad to have no plastic insert on Touch Pad.
- F. Cylinders: ANSI A156.5, Grade 1, 7 pin type. Match existing building cylinders.
1. Keying: Keyed as directed by Owner.
 2. Include construction keying.
 3. Keys: Nickel silver.
 4. Supply keys in the following minimum quantities:
 - a. 3 master keys.
 - b. 3 grand master keys.
 - c. 3 great grand master keys.
 - d. 3 construction keys.
 - e. 3 control keys and 10 extra cylinder cores.
 - f. 2 change keys for each lock.
- G. Closers: ANSI A156.4 modern type with cover, surface mounted closers; full rack and pinion type with steel spring and non-freezing hydraulic fluid; closers required for fire rated doors unless otherwise indicated.
1. Adjustability: Furnish controls for regulating closing, latching, speeds, and back checking.
 2. Arms: Type to suit individual condition; parallel-arm closers at reverse bevel doors and where doors swing full 180 degrees.
 3. Location: Mount closers on inside of exterior doors, room side of interior doors typical; mount on pull side of other doors.
4. Operating Pressure: Maximum operating pressure as follows.
 - a. Interior Doors: Maximum 5 pounds.
 - b. Exterior Doors: Maximum 10 pounds.
 - c. Fire Rated Doors: As required for fire rating, maximum 15 pounds.
 5. Door closers shall be furnished with full cover. Sized in accordance with the manufacturer's recommendations for door size and condition.
 6. Door closers shall be furnished with backcheck, delayed action, hold-open and advanced backcheck as listed in the Hardware Schedule.
 7. Door closers shall be mounted out of the line of sight wherever possible (i.e., room side of corridor doors, etc.) with parallel arm mounting on out swinging doors. Mount closer top jamb or on brackets and/or drop plates, where special conditions call for it. All closer installation on wood doors shall include sex nut bolts.
- H. Door Controls and Overhead Holders: Furnish with accessories as required for complete operational installation.
1. Manual Door Holders and Overhead Stops: ANSI A156.8, Grade 1 types as specified
- I. Push/Pulls, Protection Plates, Gaskets, Thresholds, and Trim: Furnish as indicated in Schedule, with accessories as required for complete operational door installations.
1. Push/Pulls: ANSI A156.6; push plates minimum 0.050 inch thick. Furnish straight push-pull type pulls with bolts to secure from opposite door face; furnish with minimum 0.050-inch pull plates unless otherwise indicated.
- J. Kickplates Door Edging: ANSI A156.6, metal; height indicated in Schedule by 2 inches less than door width; minimum 0.050-inch-thick stainless steel.
- K. Weatherstripping: Furnish continuous weatherstripping at top and sides of exterior doors.
1. Fire Rated Gaskets: Furnish continuous fire rated gaskets at top and sides of fire rated doors.
- L. Thresholds: Maximum 1/2-inch height.
- M. Wall Stops: ANSI A156.1, Grade 1, concave pad wall stops with no visible screws.
- N. Floor Stops: ANSI A156.1 Grade 1 dome type and door holder and strike cast; furnish with accessories as required for applications indicated.

2.3 ACCESSORIES

- A. Lock Trim: Furnish levers with rose plate as selected from manufacturer's full range of levers and roses.

1. Do not permit through bolts on solid wood core doors.
- B. Through Bolts: Do not permit through bolts and grommet nuts on door faces in occupied areas unless no alternative is possible.
 1. Do not use through bolts on solid wood core doors.

2.4 FINISHES

<u>CATEGORY</u>	<u>FINISH</u>
Butts	
Interior Non Labeled	626/652
Interior Labeled	652
Interior Corrosive Area	630
Exterior	630
Continuous Hinges (Alum. Doors)	628
Flush Bolts/Dust Proof Strikes	626
Locks/Latches	626
Cylinders	626
Exit Devices	626/630
Door Closers	ALUM
Protective Plates	630
Door Stops and Holders	626
Overhead Stops/Holders	630
Weatherstrip	689
Threshold	Aluminum

*Where indicated 630 finish, core metal shall be stainless steel.

PART 3 EXECUTION**3.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify doors and frames are ready to receive door hardware and dimensions are as instructed by manufacturer.
- C. Verify electric power is available to power operated devices and is of correct characteristics.

3.2 INSTALLATION

- A. Coordinate mounting heights with door and frame manufacturers. Use templates provided by hardware item manufacturer.
- B. Mounting Heights From Finished Floor to Center Line of Hardware Item: Comply with manufacturer recommendations and

applicable codes where not otherwise indicated.

1. Locksets: 38 inches.
2. Push/Pulls: 42 inches.
3. Dead Locks: 48 inches.
4. Push Pad Type Exit Devices: 42 inches.
5. Cross Bar Type Exit Devices: 38 inches.
6. Top Hinge: Jamb manufacturer's standard, but not greater than 10 inches from head of frame to center line of hinge.
7. Bottom Hinge: Jamb manufacturer's standard, but not greater than 12-1/2 inches from floor to center line of hinge.
8. Intermediate Hinges: Equally spaced between top and bottom hinges and from each other.
9. Hinge Mortise on Door Leaf: 1/4 inch. to 5/16 inch from stop side of door.

3.3 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Supplier shall inspect installation and certify hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified. Contractor shall correct all items noted by inspector.

3.4 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.
- B. Adjust hardware for smooth operation.
- C. Make adjustments and corrections as required by Supplier's recommendation following inspection.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.
- B. Do not permit adjacent work to damage hardware or hardware finish.
- C. The contractor shall use all means at his disposal to protect all finish hardware items from abuse, corrosion and other damage until the owner accepts the project as complete.

3.6 HARDWARE SCHEDULE

HW SET: 01

DOOR NO.: 100

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
4	EA	HINGE	5PB1 4.5x4.5	652	IVE
1	EA	ENTRANCE / OFFICE LOCK	T511H7D QUA	626	FAL
1	EA	SFIC CORE	C607	626	FAL
1	EA	WALL STOP	WS407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 02 - Provide door, frame, and hardware to meet windstorm requirements.

DOOR NO.: 101A, 101B, 101C, 101D, 101E, 101F, 101G, 101H

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
1	EA	CYLINDER	AS REQUIRED	626	FAL
1	EA	SFIC CONSTRUCTION CORE	C607CCA	626	FAL
1	EA	SFIC CORE	C607	626	FAL

HW SET: 03 - Provide door, frame, and hardware to meet windstorm requirements.

DOOR NO.: 101I

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1 4.5x4.5 NRP	630	IVE
1	EA	EXIT DEVICE	33A-L	626	VON
1	EA	DOOR LOCK	MA531H7D QG	626	FAL
1	EA	SFIC CORE	C607	626	FAL
1	EA	SURFACE CLOSURE	SC71 SS	689	FAL
1	EA	KICKPLATE	8400 10"x2" LDW B4E	630	IVE
1	EA	FLOOR STOP	FS18L	BLK	IVE
1	SET	SEALS	PS074		STE
1	EA	DOOR SWEEP	FASSEAL		STE
1	EA	THRESHOLD	950S	AL	NGP

HW SET: 04

DOOR NO.: 104

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5PB1 4.5x4.5	652	IVE
1	EA	STOREROOM LOCK	T581H7D QUA	626	FAL
1	EA	SFIC CORE	C607	626	SCH
1	EA	WALL STOP	WS407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

END OF SECTION

GLAZING

SECTION 08 80 00

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Glass for metal frames, doors, windows, and glazed walls.
 - 2. Glass and installation requirements are included in this section for other sections referencing this section.
- B. Related Sections:
 - 1. Section 07 90 00 - Joint Protection: Sealant and back-up material other than glazing sealants.
 - 2. Section 08 14 16 - Flush Wood Doors: Glazed doors.

1.2 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI Z97.1 - Safety Glazing Materials Used in Buildings Safety.
- B. American Society of Civil Engineers:
 - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- C. ASTM International:
 - 1. ASTM C509 - Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material.
 - 2. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
 - 3. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
 - 4. ASTM C1036 - Standard Specification for Flat Glass.
 - 5. ASTM C1048 - Standard Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.
 - 6. ASTM C1193 - Standard Guide for Use of Joint Sealants.
 - 7. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass.
 - 8. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
 - 9. ASTM D1929 - Standard Test Method for Determining Ignition Temperature of Plastics.
 - 10. ASTM D4802 - Standard Specification for Poly (Methyl Methacrylate) Acrylic Plastic Sheet.
 - 11. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 12. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
- 13. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
- 14. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings.
- 15. ASTM E1425 - Standard Practice for Determining the Acoustical Performance of Windows, Doors, Skylight, and Glazed Wall Systems.
- 16. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation.
- 17. ASTM E1886 - Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.
- 18. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.
- D. Consumer Products Safety Commission:
 - 1. CPSC 16 CFR 1201 - Safety Standard for Architectural Glazing.
- E. Glass Association of North America:
 - 1. GANA - Sealant Manual.
 - 2. GANA - Glazing Manual.
 - 3. GANA - Laminated Glass Design Guide.
- F. National Fenestration Rating Council Incorporated:
 - 1. NFRC 100 - Procedures for Determining Fenestration Product U-Factors.
 - 2. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.
 - 3. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide glass and glazing materials for continuity of building enclosure weather barrier:
 - 1. In conjunction with materials described in Section 07 27 26 and 07 90 00.
 - 2. To utilize inner pane of multiple pane sealed units for continuity of air barrier and vapor retarder seal.
 - 3. To maintain continuous air barrier and vapor retarder throughout glazed assembly from glass pane to heel bead of glazing sealant.
 - 4. Vertical Glass: 8 lites per 1000 for wind loads with 3 seconds maximum load duration.

5. Minimum Thickness: 1/4 inch for exterior glass.
- B. Structural Design: Design in accordance with applicable code [or values indicated in the design criteria in the structural drawings, whichever is greater, for most critical combination of wind, snow, seismic, and dead loads.
- C. Wind Loads: Design and size glass to withstand positive and negative wind loads acting normal to plane of wall, including increased loads at building corners.
 1. Design Wind Load: To design pressure of as indicated in the structural design criteria in the drawings.
- D. Wind-Borne Debris Loads: Design and size glass located less than 60 feet above grade to withstand the following loads:
 1. Glass Within 30 feet of Grade: ASTM E1886 and ASTM E1996; large missile impact test.
 2. Glass Greater than 30 feet above Grade: ASTM E1886 and ASTM E1996; small missile impact test.
- E. Seismic Loads: Design and size components to withstand seismic loads and sway displacement as calculated in accordance with applicable code.
- F. Exterior Glass Deflection: Maximum of 1/175 of glass edge length or 3/4 inch, which ever is less with full recovery of glazing materials.
- G. Interior Glass Deflection: Maximum differential deflection for two adjacent unsupported edges when 50 plf force is applied to one panel at any point up to 42 inches above finished floor less than thickness of glass.
- H. Thermal and Solar Optical Performance: Measured or calculated in accordance with the following:
 1. Maximum U-Values: Comply with ICC IECC for climate zone in which project is located. Measure in accordance with NFRC 100.
 2. Maximum SHGC: Comply with ICC IECC for climate zone in which project is located. Measure in accordance with NFRC 200.
 3. Solar Optical Properties: NFRC 300.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Signed and sealed by professional engineer.
 1. Indicate sizes, layout, thicknesses, and loading conditions for glass.
- C. Product Data:
 1. Glass and Plastic: Provide structural, physical, and thermal and solar optical performance characteristics, size limitations, special handling or installation requirements.

2. Glazing Sealants, Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors where exposed.
- D. Design Data: Signed and sealed by professional engineer.
 1. Submit design calculations for glass thicknesses.
- E. Manufacturer's Certificate: Certify sealed insulating glass, meets or exceeds specified requirements.
- F. Installer's Certificate: Certify glass furnished without identification label is installed in accordance with Construction Documents and applicable code.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA Glazing Manual, GANA Sealant Manual, GANA Laminated Glass Design Guide for glazing installation methods.
- B. Light Transmitting Plastics: Class CC2 defined by applicable code when tested in accordance with ASTM D635 in thickness for intended use.
 1. Self Ignition Temperature: Minimum 650 degrees F when tested in accordance with ASTM D1929.
 2. Smoke Developed Index: Maximum 450 when tested in accordance with ASTM E84 or maximum 75 when tested in accordance with ASTM D2843 in thickness for intended use.

1.6 QUALIFICATIONS

- A. Installer: Company specializing in performing Work of this section with minimum three years documented experience approved by manufacturer.
- B. Design glass under direct supervision of Professional Engineer experienced in design of this Work and licensed in the state of Texas.

1.7 PRE-INSTALLATION MEETING

- A. Section 01 30 00 - Administrative Requirements: Preinstallation meeting.
- B. Convene minimum one week before starting Work of this section.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements.
- B. Do not install glazing when ambient temperature is less than 50 degrees F.
- C. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.9 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish five-year warranty to include coverage for sealed glass units from seal failure, interpane dusting or misting, and replacement of same.

PART 2 PRODUCTS**2.1 FLOAT GLASS MATERIALS**

- A. Annealed Glass: ASTM C1036, Type 1 transparent flat, Quality Q3, float glass.
 - 1. Furnish annealed glass except where heat strengthened, or tempered glass is required to meet specified performance requirements.
- B. Heat Strengthened Glass: ASTM C1048, Type 1 transparent flat, Quality Q3, Kind HS heat strengthened, Condition A uncoated, float glass.
 - 1. Furnish heat strengthened glass where annealed glass cannot meet specified performance requirements.
- C. Tempered Glass: ASTM C1048, Type 1 transparent flat, Quality Q3, Kind FT fully tempered, Condition A uncoated, float glass with horizontal tempering.
 - 1. Furnish tempered glass where heat strengthened glass cannot meet specified performance requirements.
 - 2. Furnish tempered glass where safety glass is required by applicable code and as indicated on Drawings. Tempered glass shall conform to CPSC 16 CFR 1201 Category II or Category I, in accordance with requirements of size, location and use as required by the applicable code.

2.2 FLOAT GLASS PRODUCTS

- A. Float Glass Manufacturers:
 - 1. AGC Flat Glass North America
 - 2. Guardian Industries Corp.
 - 3. Oldcastle BuildingEnvelope
 - 4. Pilkington North America, Inc.
 - 5. PPG Industries, Inc. (design basis)
 - 6. Viracon, Inc.
 - 7. Substitutions: Section 01 60 00 - Product Requirements.
- B. Clear Glass: Annealed, Heat strengthened, and Tempered float glass as specified; Class 1 clear.
 - 1. Clear annealed glass (FG-CA).
 - 2. Clear heat strengthened glass (FG-CH).
 - 3. Clear tempered glass (FG-CT).
 - 4. Minimum Thickness: 1/4 inch.
- C. Low E Glass: Annealed, Heat strengthened, and Tempered float glass as specified; Class 1 clear.
 - 1. Clear Low E annealed glass (FG-ECA).
 - 2. Clear Low E heat strengthened glass (FG-ECH).
 - 3. Clear Low E tempered glass (FG-ECT).

- 4. Minimum Thickness: 1/4 inch.
- 5. Coating: ASTM C1376; vacuum deposited.
 - a. Solarban 60 manufactured by PPG, or equal.
- 6. Solar Light Transmittance: 70 percent.
- 7. Solar Heat Gain Coefficient: 0.38.
- 8. Clear Glass:
 - a. PPG Industries, Inc.; Clear
 - b. Substitutions: Section 01 60 00 - Product Requirements.

2.3 INSULATING GLASS PRODUCTS

- A. Insulating Glass Manufacturers:
 - 1. AGC Flat Glass North America
 - 2. Guardian Industries Corp.
 - 3. Oldcastle BuildingEnvelope
 - 4. Pilkington North America, Inc.
 - 5. PPG Industries, Inc. (design basis)
 - 6. Viracon, Inc.
 - 7. Substitutions: Section 01 60 00 - Product Requirements.
- B. Insulating Glass: ASTM E2190 certified by Insulating Glass Certification Council and Insulating Glass Manufacturers Alliance; with primary polyisobutylene and secondary silicone edge seal; purge interpane space with dry hermetic air.
 - 1. Total Unit Thickness: 1 inch.
 - 2. Insulating Glass Unit Edge Seal Construction:
 - a. Stainless steel bent and spot welded corners.
 - b. Polyisobutylene sealant primary seal.
 - c. Silicone sealant secondary seal.
- C. Double Pane Clear Insulating Vision Glass (IG-DP-C):
 - 1. Total Unit Thickness: 1 inch.
 - 2. Outer Pane: Glass Type FG-ECA, FG-ECH, or FG-ECT as scheduled and/or required by code.
 - a. Low-E coating on #2 surface.
 - 3. Inner Pane: Glass Type FG-CA, FG-CH, or FG-CT as scheduled and/or required by code.
 - 4. U-Factor Winter: 0.29 maximum.
 - 5. U-Factor Summer: 0.27 maximum.
 - 6. Solar Heat Gain Coefficient: 0.40 maximum.
 - 7. UV Transmittance: 25% maximum.
 - 8. Visible Light Transmittance: 74% minimum.
 - 9. Solar Transmittance: 38% maximum.
 - 10. Reflectance: 11% maximum.

2.4 GLAZING SEALANTS

- A. Elastomeric Glazing Sealants: Materials compatible with adjacent materials including glass, [laminated glass core,] [insulating glass seals,] and glazing channels.
- B. Dense Gaskets: Resilient extruded shape to suit glazing channel retaining slot; black color.
 - 1. Neoprene: ASTM C864.
 - 2. EPDM: ASTM C864.
 - 3. Silicone: ASTM C1115.

- C. Soft Gaskets: ASTM C509; resilient extruded shape to suit glazing channel retaining slot; black color.
 - 1. Neoprene.
 - 2. EPDM.
 - 3. Silicone.
- D. Pre-Formed Glazing Tape: Size to suit application.
 - 1. Preformed butyl compound [with integral resilient tube spacing device]; 10 to 15 Shore A durometer hardness; coiled on release paper; black color.
 - a. Butyl Corner Sealant: ASTM C920 single component non-skinning butyl compatible with glazing tape; color to match tape.

2.5 GLAZING ACCESSORIES

- A. Setting Blocks: Elastomeric material recommended by glass manufacturer, 80 to 90 Shore A durometer hardness, length of 0.1 inch for each square foot of glazing or minimum 4-inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.
- B. Spacer Shims: Elastomeric material recommended by glass manufacturer, 50 to 60 Shore A durometer hardness, minimum 3-inch-long x one half the height of glazing stop x thickness to suit application, self adhesive on one face.
- C. Stainless Steel Edge Trim: Stainless steel edge trim to protect the edge of mirrored glass, installed at top, bottom, and ends of mirror not abutting adjacent mirrored glass.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify openings for glazing are correctly sized and within acceptable tolerance.
- C. Verify surfaces of glazing channels or recesses are clean, free of obstructions impeding moisture movement, weeps are clear, and ready to receive glazing.

3.2 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant.

3.3 INSTALLATION

- A. Perform installation in accordance with GANA Glazing Manual.
 - 1. Glazing Sealants: Comply with ASTM C1193.
- B. Interior Dry Method (Tape and Tape) Installation:
 - 1. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.
 - 2. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
 - 3. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.
 - 4. Place glazing tape on free perimeter of glazing in same manner described above.
 - 5. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
 - 6. Knife trim protruding tape.

3.4 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Remove glazing materials from finish surfaces.
- C. Remove labels after Work is complete.
- D. Clean glass and adjacent surfaces.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.
- B. After installation, mark pane with an 'X' by using removable plastic tape or paste. Do not mark heat absorbing or reflective glass units.

3.6 SCHEDULE

- A. Interior Framed Windows, typical: Type FG-CT, interior dry method.

END OF SECTION

DIVISION 9

FINISHES

THE AGREEMENT, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, SUPPLEMENTARY CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, AND ALL ADDENDA ARE A PART OF THE CONTRACT. THE CONTRACTOR SHALL CONSULT THEM IN DETAIL FOR INSTRUCTIONS PERTAINING TO THE WORK. THE CONTRACTOR SHALL ALSO CONSULT ALL OTHER DIVISIONS AND SECTIONS OF THE PROJECT MANUAL, AND ALL DRAWINGS IN THE EXECUTION OF THE WORK OF THE CONTRACT.

THE CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, SYSTEMS, EQUIPMENT, ITEMS, ARTICLES, OPERATIONS, AND/OR METHODS LISTED, IMPLIED, MENTIONED, OR SCHEDULED IN THE CONTRACT DOCUMENTS AND/OR NECESSARY AND/OR REQUIRED FOR THE SATISFACTORY COMPLETION OF THE WORK.

THE LISTING OF WORK, REQUIREMENTS, AND PRODUCTS IN THIS SECTION IS NOT INTENDED TO BE CONCLUSIVE. THE CONTRACTOR SHALL CHECK ALL OTHER PARTS OF THE CONTRACT DOCUMENTS AND SHALL PROVIDE ALL MISCELLANEOUS ITEMS OF WORK AND PRODUCTS NECESSARY FOR THE SATISFACTORY COMPLETION OF THE WORK DESCRIBED IN THE CONTRACT DOCUMENTS.

**SECTION 09 21 16
GYPSUM BOARD ASSEMBLIES**

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Metal channel ceiling framing.
 - 2. Gypsum board, joint treatment, and finishing.
- B. Related Requirements:
 - 1. Section 05 40 00 - Cold-Formed Metal Framing.
 - 2. Section 05 50 00 - Metal Fabrications.
 - 3. Section 06 10 00 - Rough Carpentry: Building wood framing system, wood blocking for support.
 - 4. Section 07 21 16 - Blanket Insulation: Acoustic and Thermal insulation.
 - 5. Section 09 90 00 - Painting and Coating.
 - 6. Division 23 – Mechanical Penetration.
 - 7. Division 26 – Electrical Penetrations.

1.2 REFERENCE STANDARDS

- A. American Society of Civil Engineers:
 - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- B. ASTM International:
 - 1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - 2. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-formed Framing Members
 - 3. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
 - 4. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board.
 - 5. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
 - 6. ASTM C1002 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases.
 - 7. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel.
 - 8. ASTM C1280 - Standard Specification for Application of Gypsum Sheathing.
 - 9. ASTM C1288 - Standard Specification for Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets.
 - 10. ASTM C1325 - Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cement Substrate Sheets.

- 11. ASTM C1396/C1396M - Standard Specification for Gypsum Board.
- 12. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
- 13. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- 14. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
- 15. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
- 16. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.
- C. Gypsum Association:
 - 1. GA 214 - Recommended Levels of Gypsum Board Finish.
 - 2. GA 216 - Application and Finishing of Gypsum Board.
 - 3. GA-234 – Control Joints for Fire-Resistance Rated System.
 - 4. GA 600 - Fire Resistance Design Manual Sound Control.
- D. Intertek Testing Services (Warnock Hersey Listed):
 - 1. WH - Certification Listings.
- E. National Fire Protection Association:
 - 1. NFPA 265 - Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls, Method B.
 - 2. NFPA 286 - Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Wall and Ceiling Interior Finish.
- F. South Coast Air Quality Management District:
 - 1. SCAQMD Rule 1168 - Adhesive and Sealant Applications.
- G. Underwriters Laboratories Inc.:
 - 1. UL - Fire Resistance Directory.

1.3 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.
- C. Attendance: General Contractor, sub-contractor placing work of this section, and Architect.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data on metal framing and trim accessories, gypsum board, backer boards, joint tape, joint and finish compounds, and acoustic accessories.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ASTM C754, ASTM C1280, GA-214, GA-216, and GA-600.
- B. Fire Rated Wall Construction: Rating as indicated on Drawings
 - 1. Tested Rating: Determined in accordance with ASTM E119.
- C. Surface Burning Characteristics:
 - 1. Textile Wall Coverings: Comply with one of the following:
 - 2. Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
 - a. Requirements of applicable code when tested in accordance with NFPA 265 Method B test protocol.
 - b. Requirements of applicable code when tested in accordance with NFPA 286.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years' experience.
- B. Installer: Company specializing in performing Work of this section with minimum five years' experience.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Store materials according to manufacturer instructions.
- D. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Provide additional protection according to manufacturer instructions.

1.8 AMBIENT CONDITIONS

- A. Section 01 50 00 - Temporary Facilities and Controls: Requirements for ambient condition control facilities for product storage and installation.
- B. Maintain temperature at not less than 40 degrees F for the mechanical application of gypsum board unless otherwise recommended by manufacturer.
- C. Maintain temperature at not less than 50 degrees F for the adhesive application of gypsum board, and for field finishing and texturing, unless otherwise recommended by manufacturer.

PART 2 PRODUCTS**2.1 MANUFACTURERS**

- A. Suspended Gypsum Furring Systems Manufacturer List:

- 1. Armstrong.
- 2. Chicago Metallic Corporation.
- 3. USG.
- 4. Section 01 60 00 - Product Requirements: Requirements for substitutions for other manufacturers and products.
- B. Gypsum Board Manufacturer List:
 - 1. American Gypsum.
 - 2. CertainTeed.
 - 3. Georgia-Pacific.
 - 4. National Gypsum Co.
 - 5. Pabco Gypsum
 - 6. United States Gypsum Co.
 - 7. Section 01 60 00 - Product Requirements: Requirements for substitutions for other manufacturers and products.

2.2 PERFORMANCE AND DESIGN CRITERIA:

- A. Acoustic Attenuation for Identified Interior Partitions: Sound Transmission Class (STC) as indicated in the partition type, according to ASTM E90.

2.3 MATERIALS

- A. Suspended Gypsum Furring System Materials:
 - 1. Furring Runners: Manufactured from minimum 0.020-inch-thick steel 1-3/8 inch wide with knurled face by 1-1/2 inches high by 144 inches long with factory punched cross tee slots, hanger holes, and non-directional bayonet end tab couplings.
 - 2. Furring Tees: Manufactured from minimum 0.020-inch-thick steel 1-3/8 inch wide with knurled face by 1-1/2 inches high by 48 inches long with hook type end tab couplings, factory punched cross tee slots and hanger holes.
 - 3. Furring Cross Chancel: Manufactured from minimum 0.020-inch-thick steel 1-3/8 inch wide with knurled face by 7/8 inches high by 48 inches long with straight locking end tabs.
 - 4. Cross Tees: Manufactured from minimum 0.020-inch-thick steel 15/16 inch wide by 1-1/2 inches high by 48 inches long with hook type end tab couplings, factory punched cross tee slots and hanger holes.
 - 5. Wall Track: Manufactured from minimum 0.020 inch thick steel 1-9/16 inches high by 120 inches long with a 1 inch top and bottom flange.
 - 6. Metal Studs: As necessary; minimum 20 gauge.
 - 7. Hanger Wires: 12-gauge galvanized steel.
- B. Gypsum Board Materials: ASTM C1396/C1396M.
 - 1. Interior Gypsum Board (non-perimeter walls) and Fire Rated Gypsum Board: 5/8 inch thick, maximum available length in place; ends square cut, tapered edges; Type X.
 - a. American Gypsum; Firebloc Type X Gypsum Board.
 - b. CertainTeed; Type X Drywall.

- c. Georgia-Pacific; ToughRock Fireguard X Gypsum Board, paper facing.
 - d. National Gypsum; Gold Bond Fire-Shield X
 - e. Pabco Gypsum; Flame Curb Type X.
 - f. United States Gypsum Co., Sheetrock Firecode X, paper facing.
 - g. Section 01 60 00 - Product Requirements: Requirements for substitutions for other manufacturers and products.
2. Interior Perimeter Wall Gypsum Board: 5/8 inch thick, glass mat faced, maximum available length in place; ends square cut, tapered edges.
- a. CertainTeed; Diamondback Glasroc Tile Backer Type X.
 - b. Georgia-Pacific; DensArmor Plus Fireguard High-Performance Interior Panel, glass fiber mat facing, ASTM C1658
 - c. National Gypsum; Gold Bond eXP Interior Extreme Gypsum Panel.
 - d. United States Gypsum Co.; Glass-Mat Panels Mold Tough Firecode X.
 - e. Section 01 60 00 - Product Requirements: Requirements for substitutions for other manufacturers and products.
 - f. Section 01 60 00 - Product Requirements: Requirements for substitutions for other manufacturers and products.

2.4 ACCESSORIES

- A. Acoustic Insulation: As specified in Section 07 21 16.
- B. Acoustic Sealant:
 - 1. Wall insulation as specified in Section 07 90 00.
- C. Gypsum Board Accessories: ASTM C1047; metal; corner beads, edge trim, and expansion joints.
 - 1. Metal Accessories: Galvanized steel.
 - a. Corner Beads:
 - 1) External Corners: United States Gypsum Co., Dur-A-Bead Metal Corner Bead or equal.
 - 2) Internal Corners: United States Gypsum Co., Sheetrock Flex Metal Tape or equal metal reinforced tape.
 - b. Edge Trim: GA-216; Type 200-A and 200-B by United States Gypsum Co. or equal.
 - c. Control Joints:
 - 1) United States Gypsum Co. 093 or equal.
- D. Joint Materials: GA-216; reinforcing tape, joint compound, and water.
- E. Ensure joint and finish compounds are compatible with and recommended by the manufacturer for the specific product on which they will be applied.
- F. Anchorage to Substrate: Type and size to suit application.
- G. Seismic Bracing: As required for seismic performance requirements.
- H. Gypsum Board Screws: ASTM C954 for screws attaching to studs 0.033 inch thick or greater

and ASTM C1002 where attaching to studs less than 0.033 inch thick and wood studs; length to suit application.

- 1. Screws for Steel Framing: Type S.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify site conditions are ready to receive work and opening dimensions are as instructed by manufacturer.
- C. Verify that rough-in utilities are in place.
- D. Verify that opening dimensions are as indicated on Shop Drawings and/or instructed by manufacturer.

3.2 INSTALLATION

- A. Wall Furring Installation:
 - 1. Erect metal stud framing spaced 1/4 inch from walls, attached by adjustable furring brackets.
- B. Ceiling Framing Installation:
 - 1. Install in accordance with ASTM C754 and GA-216.
 - 2. Coordinate location of hangers with other work.
 - 3. Install ceiling framing independent of walls, columns, and above ceiling work.
 - 4. Bracing:
 - a. Reinforce openings in ceiling suspension system which interrupt main carrying channels or furring channels, with lateral channel bracing.
 - b. Extend bracing minimum 24 inches past each end of openings.
 - c. Laterally brace entire suspension system.
- C. Acoustic Accessories Installation:
 - 1. Install resilient channels at maximum 24 inches on center.
 - 2. Locate joints over framing members.
 - 3. Install acoustic sealant within partitions in accordance with manufacturer's instructions and as described elsewhere in this section.
 - 4. [Install acoustic isolation strip equal to Kinetics Noise Control Model RWS.]
- D. Gypsum Board Installation:
 - 1. Install gypsum board in accordance with ASTM C840, GA-216, and GA-600.
 - 2. Erect single layer fire rated gypsum board vertically, with edges and ends occurring over firm bearing.
 - 3. Erect exterior gypsum sheathing in accordance with ASTM C1280, horizontally, with edges butted tight and ends occurring over firm bearing.
 - 4. Erect exterior gypsum soffit board perpendicular to supports, with staggered end joints over supports.
 - 5. Fasteners:

- a. Use screws when fastening gypsum board to metal furring or framing.
- b. Use screws when fastening gypsum board to wood furring or framing.
- 6. Double Layer Applications:
 - a. Use fire-rated gypsum board for first layer secured to framing/furring with fasteners.
 - b. Secure second layer to first with fasteners.
 - c. Place second layer perpendicular to first layer.
 - d. Offset joints of second layer from joints of first layer.
- 7. Treat cut edges and holes in moisture resistant gypsum board and exterior gypsum soffit board and sheathing with sealant.
- 8. Control Joints:
 - a. Place control joints consistent with lines of building spaces.
 - b. Space at maximum of 30 feet both horizontally and vertically, and as shown on drawings.
 - c. In fire-rated partitions, ensure wall cavity behind joint is filled with gypsum board as indicated in GA-234.
- 9. Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.
- 10. Install J-moulding at all conditions where drywall meets CMU or Brick.
 - a. Leave 3/16 inch gap between end of drywall and CMU or brick. Apply backer rod and sealant in accordance with section 07 90 00 to seal the gap.
- E. Joint Treatment:
 - 1. Gypsum wall, fur down, and ceiling finishes shall be smooth.
 - a. All panels scheduled to be exposed and unpainted shall be finished to a minimum GA-214 Level 1.
 - 1) All joints and interior angles shall have tape embedded in joint compound. Tool marks and ridges are acceptable.
 - b. All panels scheduled as a substrate for tile shall be finished to a minimum GA-214 Level 2.
 - 1) All joints and interior angles shall have tape embedded in joint compound and wiped with a joint knife leaving a thin coating of joint compound over all joints and interior angles.
 - 2) Fastener heads and accessories shall be covered with a coat of joint compound.
 - 3) Surface shall be free of excess joint compound. Tool marks and ridges are acceptable.
 - 4) Joint compound applied over the body of the tape at the time of tape embedment shall be considered a separate coat of joint compound and shall satisfy the conditions of this level.
 - 5) All joints and interior angles shall have tape embedded in joint compound and three separate coats of joint compound applied over all joints, angles, fastener heads and accessories.
 - c. All panels scheduled for exposed painted surfaces shall be finished to GA-214 Level 5.
 - 1) All joints and interior angles shall have tape embedded in joint compound and shall be immediately wiped with a joint knife leaving a thin coating of joint compound over all joints and interior angles.
 - 2) Two separate coats of joint compound shall be applied over all flat joints and one separate coat of joint compound shall be applied over interior angles.
 - 3) Fastener heads and accessories shall be covered with three separate coats of joint compound.
 - 4) A thin skim coat of joint compound trowel applied, or a material manufactured especially for this purpose and applied in accordance with manufacturer's recommendations, applied to the entire surface.
 - 5) The surface shall be smooth and free of tool marks and ridges.
 - 2. Feather coats on adjoining surfaces such that maximum camber is 1/32 inch.
 - 3. Fill and finish joints and corners of cementitious backing board.

3.3 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation of Finished Gypsum Board Surface from Flat Surface: 1/8 inch in 10 feet in any direction.

3.4 PROTECTION

- A. Section 017000 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Protect gypsum board installations and finish from damage and deterioration until date of Substantial Completion.

3.5 SCHEDULE

- A. Office 100: Ceiling application.

END OF SECTION

SECTION 09 51 13
ACOUSTICAL PANEL CEILINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Acoustic panels.
 - 2. Suspended metal grid ceiling system and perimeter trim.
 - 3. Supplementary acoustic insulation over system units.
- B. Related Requirements:
 - 1. Section 07 21 16 - Blanket Insulation.
 - 2. Section 07 90 00 - Joint Protection.

1.2 REFERENCE STANDARDS

- A. ASTM International:
 - 1. ASTM C635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
 - 2. ASTM C636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
 - 3. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - 4. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 5. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
 - 6. ASTM E580/E580M - Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint.
 - 7. ASTM E1264 - Standard Classification for Acoustical Ceiling Products.
- B. American Society of Civil Engineers:
 - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- C. Ceilings and Interior Systems Construction Association:
 - 1. Cisca - Acoustical Ceilings: Use and Practice.

1.3 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.4 SEQUENCING

- A. Section 01 10 00 - Summary: Requirements for sequencing.
- B. Sequence Work to ensure acoustic ceilings are not installed until building is enclosed, sufficient

heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

- C. Install acoustic units after interior wet work is dry.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data on metal grid system components, acoustic units.
- C. Manufacturer's Instructions: Submit special procedures, perimeter conditions requiring special attention.

1.6 QUALITY ASSURANCE

- A. Conform to Cisca requirements.
- B. Surface Burning Characteristics: Maximum Class B 75/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

1.8 AMBIENT CONDITIONS

- A. Section 01 50 00 - Temporary Facilities and Controls: Ambient conditions control facilities for product storage and installation.
- B. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustic unit installation.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Armstrong.
- B. CertainTeed.
- C. USG
- D. Substitutions: Section 01 60 00 - Product Requirements: Requirements for substitutions for other manufacturers and products.

2.2 SUSPENDED ACOUSTICAL CEILINGS

- A. Manufacturer and Product List – Typical installation:
 - 1. Armstrong; Fine Fissured #1732 as basis of design.
 - 2. Substitutions: Section 01 60 00 - Product Requirements: Requirements for substitutions for other manufacturers and products.

- B. Manufacturer and Product List – Grid - Typical:
 - 1. Armstrong; Prelude XL as basis of design.
- C. Performance / Design Criteria:
 - 1. Suspension System: Rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of 1/360 of span.

2.3 COMPONENTS

- A. Acoustic Panels-Typical: conforming to the following:
 - 1. ASTM E1264 Type III, Form 2.
 - 2. Size: 24 x 24 inches.
 - 3. Thickness: 5/8 inches.
 - 4. Composition: Mineral.
 - 5. Light Reflectance: ≥85 percent.
 - 6. NRC: ≥0.55
 - 7. CAC: ≥35
 - 8. Edge: Rabbeted.
 - 9. Surface Color: White.
 - 10. Surface Finish: ASTM #1264 C/Perforated Small Holes and E/Lightly Textured
- B. Grid:
 - 1. Non-fire Rated Grid: ASTM C635, heavy duty; exposed T; components die cut and interlocking.
 - 2. Grid Materials: Commercial quality cold rolled steel with galvanized coating.
 - 3. Exposed Grid Surface Width: 15/16 inch.
 - 4. Grid Finish: White color.
 - 5. Accessories: Stabilizer bars, clips, splices, perimeter moldings, hold down clips, and hanger wire required for suspended grid system and as required by applicable code for seismic design category.
 - 6. Support Channels and Hangers: Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.

2.4 ACCESSORIES

- A. Acoustic Batt Insulation: Specified in Section 07 21 16, unfaced; 3.5-inch-thick, roll form.
- B. Aluminum Edge Trim:
 - 1. Armstrong Axiom Classic Trim.
 - a. 6 inches high.
 - b. T6063 aluminum
- C. Hanger Wire: Galvanized carbon steel, soft temper, pre-stretched, yield stress load at least three times design load but not less than 12 gauge.
- D. Touch-up Paint: Type and color to match acoustic and grid units.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.

- B. Verify layout of hangers will not interfere with other work.

3.2 INSTALLATION

- A. Lay-In Grid Suspension System:
 - 1. Install suspension system in accordance with ASTM C635, ASTM C636 and as supplemented in this section.
 - 2. Install system capable of supporting imposed loads with maximum deflection of 1/360 maximum.
 - 3. Locate system on room axis according to reflected plan.
 - 4. Install after major above ceiling work is complete. Coordinate location of hangers with other work.
 - 5. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
 - 6. Where ducts or other equipment prevent regular spacing of hangers, reinforce nearest affected hangers [and related carrying channels] to span extra distance.
 - 7. Do not support components on main runners or cross runners when weight causes total dead load to exceed deflection capability. Support fixture loads by supplementary hangers located within 6 inches of each corner; or support components independently.
 - 8. Do not eccentrically load system or produce rotation of runners.
 - 9. Form expansion joints as detailed. Form to accommodate plus or minus 1-inch movement. Maintain visual closure.
- B. Acoustic Units:
 - 1. Fit acoustic units in place, free from damaged edges or other defects detrimental to appearance and function.
 - 2. Lay directional patterned units in basket weave pattern. Fit border trim neatly against abutting surfaces.
 - 3. Install units after above ceiling work is complete.
 - 4. Install acoustic units level, in uniform plane, and free from twist, warp, and dents.
 - 5. Cutting Acoustic Units:
 - a. Cut to fit irregular grid and perimeter edge trim.
 - b. Cut bevel edges to field cut units.
 - c. Double cut and field paint exposed edges of regular units.
 - 6. Lay acoustic insulation on top of suspended acoustic tile. Lay roll insulation perpendicular and across grid crossing the short direction for rectangular panels.

3.3 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.

- B. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- C. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.4 SCHEDULE

- A. Reference reflected ceiling plans in drawings for additional information.

END OF SECTION

**SECTION 09 65 00
RESILIENT FLOORING**

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes
 - 1. Resilient tile flooring
 - 2. Resilient base.
 - 3. Resilient transition accessories.
- B. Related Sections:
 - 1. Section 03 30 00 – Cast-In-Place Concrete.
 - 2. Section 04 20 16 – Unit Masonry Assemblies: Substrate for wall base.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 2. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile.
 - 3. ASTM F1861 - Standard Specification for Resilient Wall Base.
- B. National Fire Protection Association:
 - 1. NFPA 253 - Standard Method of Test for Critical Radiant Flux for Floor Covering Systems Using a Radiant Heat Energy Source.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate seaming plan, custom patterns and inlay designs.
- C. Product Data: Submit data describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- D. Installation Instructions: Submit manufacturer's installation instructions.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Operation and Maintenance Data: Submit maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.5 QUALITY ASSURANCE

- A. Surface Burning Characteristics:
 - 1. Floor Finishes and Stair Coverings: Class I, minimum 0.45 watts/sq cm when tested in accordance with NFPA 253.
 - 2. Base Material: Class I, minimum 0.45 watts/sq cm when tested in accordance with NFPA 253.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this

section with minimum three years documented experience.

- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements.
- B. Maintain temperature in storage area between 55 degrees F and 90 degrees F.
- C. Store materials for not less than 48 hours prior to installation in area of installation at temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

1.9 EXTRA MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Furnish 25 sq ft of flooring for each 625 sq ft installed or fraction thereof, 25 lineal feet of base or 5 percent of amount installed, whichever is greater, [and 5 percent of installed stair materials] of each type and color specified.

PART 2 PRODUCTS

2.1 TILE FLOORING

- A. Vinyl Composition Tile:
 - 1. Manufacturers and Products
 - a. Armstrong; Standard Excelon Imperial.
 - b. Congoleum Corp.
 - c. Tarkett-Azrock.
 - d. Substitutions: Section 01 60 00 - Product Requirements.
 - 2. Size: 12 x 12 inch.
 - 3. Thickness: 1/8 inch.
 - 4. Color: As selected from full range available.
 - a. Selection: 90% Field Color and 10% Accent Color.

2.2 RESILIENT BASE

- A. Manufacturers:
 - 1. Burke; Burke Base.
 - 2. Flexco; Wallflowers.
 - 3. Johnsonite; Baseworks Thermoset Rubber Wallbase.
 - 4. Mannington; Optimum Edge.
 - 5. Roppe; Pinnacle.
 - 6. Substitutions: Section 01 60 00 - Product Requirements.
- B. Base: ASTM F1861 Type TS - Vulcanized, Group 1 – Solid, Style B cove:

1. Height: 4 inch.
2. Thickness: 0.125 inch thick.
3. Finish: Satin.
4. Length: 4 foot sections or Roll.
5. Accessories: Premolded external corners and end stops. Same material, size, and color of base.
6. Color: As selected.

2.3 ACCESSORIES

- A. Subfloor Filler: Cementitious; type recommended by adhesive material manufacturer.
- B. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.
- C. Moldings and Edge Strips: Same manufacturer, material, and color as flooring.
 1. VCT to Concrete Transition: Burke #633 as design basis.
- D. Sealer and Wax: Types recommended by flooring manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify that surfaces are smooth and flat with a maximum variation of 1/8 inch in 10 ft. and are ready to receive work.
- C. Verify concrete floors are dry to maximum moisture content as recommended by manufacturer, and exhibit negative alkalinity, carbonization, and dusting.
- D. Verify floor and lower wall surfaces are free of substances capable of impairing adhesion of new adhesive and finish materials.

3.2 PREPARATION

- A. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.
- B. Prohibit traffic until filler is cured.
- C. Vacuum clean substrate.
- D. Apply primer as recommended by manufacturer or required to prevent "bleed-thru" or interference with adhesion by substances cannot be removed.

3.3 INSTALLATION - TILE FLOORING

- A. Install in accordance with manufacturer's instructions.
- B. Mix tile from container to ensure shade variations are consistent when tile is placed.

- C. Spread only enough adhesive to permit installation of materials before initial set.
- D. Set flooring in place pressing with heavy roller (100 pounds) to attain full adhesion.
- E. Lay flooring with joints and seams parallel to building lines to produce symmetrical tile pattern.
- F. Install tile to basket weave pattern. Allow minimum 1/2 full size tile width at room or area perimeter.
- G. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
- H. Where floor finishes are different on opposite sides of door, terminate flooring under centerline of door.
- I. Install edge strips/mouldings at unprotected or exposed edges, where flooring terminates, and where indicated.
- J. Install flooring in recessed floor access covers. Maintain floor pattern.
- K. At movable partitions, install flooring under partitions without interrupting floor pattern.

3.4 INSTALLATION - BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
- B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.
- C. Install base on solid backing. Bond tightly to wall and floor surfaces.
- D. Scribe and fit to door frames and other interruptions.

3.5 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Remove excess adhesive from floor, base, and wall surfaces without damage.
- C. Clean, seal, and maintain resilient flooring products.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.
- B. Prohibit traffic on resilient flooring for 48 hours after installation.

3.7 SCHEDULE

- A. Refer to Contract Drawings and to Room Finish Schedule for locations of specified materials

END OF SECTION

**SECTION 09 90 00
PAINTING AND COATING**

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and field application of paints, stains, varnishes, and other coatings.
- B. Related Sections:
 - 1. Section 04 20 00 – Unit Masonry.
 - 2. Section 05 12 00 – Structural Steel.
 - 3. Section 05 50 00 - Metal Fabrications: Shop primed and unprimed items.
 - 4. Section 08 12 13.13 – Standard Hollow Metal Frames.
 - 5. Section 08 13 13.13 – Standard Hollow Metal Doors.
 - 6. Section 09 21 16 - Gypsum Board Assemblies.

1.2 REFERENCE STANDARDS

- A. ASTM International:
 - 1. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.
 - 2. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials.
 - 3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. National Association of Corrosion Engineers:
 - 1. Industrial Maintenance Painting
- C. Painting and Decorating Contractors of America:
 - 1. PDCA - Architectural Painting Specification Manual.
- D. SSPC: The Society for Protective Coatings:
 - 1. SSPC - Steel Structures Painting Manual.

1.3 DEFINITIONS

- A. Conform to ASTM D16 for interpretation of terms used in this section.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on all finishing products and special coatings.
- C. Manufacturer's Installation Instructions: Submit special surface preparation procedures and substrate conditions requiring special attention.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Operation and Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

1.6 QUALITY ASSURANCE

- A. Surface Burning Characteristics:
 - 1. Fire Retardant Finishes: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

- B. Conform to the International Building Code for flame and smoke rating requirements for products and finishes.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' experience.
- B. Applicator: Company specializing in performing work of this section with minimum three years documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- C. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- D. Paint Materials: Store at minimum ambient temperature of 45 degrees F and maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements.
- B. Do not apply materials when surface and ambient temperatures are outside temperature ranges required by paint product manufacturer.
- C. Do not apply exterior coatings during rain or snow when relative humidity is outside humidity ranges, or moisture content of surfaces exceed those required by paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- E. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.
- F. Provide lighting level of 80 ft candle measured mid-height at substrate surface.

1.10 SEQUENCING

- A. Section 01 10 00 - Summary: Work sequence.
- B. Sequence application to the following:
 - 1. Do not apply finish coats until paintable sealant is applied.
 - 2. Back prime wood trim before installation of trim.

1.11 EXTRA MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Supply 1 gallons of each color, type, and surface texture; store where directed.

- C. Label each container with color, type, texture, room locations, and date in addition to manufacturer's label.

PART 2 PRODUCTS

2.1 PAINTS AND COATINGS

- A. Manufacturers: Paint Transparent Finishes Stain Primer Sealers Block Filler Field Catalyzed Coatings.
 1. Sherwin Williams as basis of design.
 2. PPG Architectural Finishes: Pittsburg Paints.
 3. Kelly-Moore Paints.
 4. Substitutions: Section 01 60 00 - Product Requirements.

2.2 COMPONENTS

- A. Coatings: Ready mixed, except field catalyzed coatings. Prepare coatings:
 1. To soft paste consistency, capable of being readily and uniformly dispersed to homogeneous coating.
 2. For good flow and brushing properties.
 3. Capable of drying or curing free of streaks or sags.
- B. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve finishes specified; commercial quality.
- C. Patching Materials: Latex filler.
- D. Fastener Head Cover Materials: Latex filler.

2.3 FINISHES

- A. Refer to schedule at end of section for surface finishes.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify surfaces and substrate conditions are ready to receive Work as instructed by product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report conditions capable of affecting proper application.
- D. Test shop applied primer for compatibility with subsequent cover materials.
- E. Measure moisture content of surfaces using electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 1. Plaster and Gypsum Wallboard: 12 percent.
 2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
 3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
 4. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.
 5. Concrete Floors: 8 percent.

3.2 PREPARATION

- A. Surface Appurtenances: Remove electrical plates, hardware, light fixture trim, escutcheons,

and fittings prior to preparing surfaces or finishing.

- B. Surfaces: Correct defects and clean surfaces capable of affecting work of this section. Remove or repair existing coatings exhibiting surface defects.
- C. Marks: Seal with shellac those which may bleed through surface finishes.
- D. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- E. Aluminum Surfaces Scheduled for Paint Finish: Remove surface contamination by steam or high-pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.
- F. Asphalt, Creosote, or Bituminous Surfaces Scheduled for Paint Finish: Remove foreign particles to permit adhesion of finishing materials. Apply compatible sealer or primer.
- G. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.
- H. Concrete Floors: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
- I. Copper Surfaces Scheduled for Paint Finish: Remove contamination by steam, high pressure water, or solvent washing. Apply vinyl etch primer immediately following cleaning.
- J. Copper Surfaces Scheduled for Natural Oxidized Finish: Remove contamination by applying oxidizing solution of copper acetate and ammonium chloride in acetic acid. Rub on repeatedly for required effect. Once attained, rinse surfaces with clear water and allow to dry.
- K. Gypsum Board Surfaces: Fill minor defects with filler compound. Spot prime defects after repair.
- L. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- M. Concrete and Unit Masonry Surfaces Scheduled to Receive Paint Finish: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- N. Plaster Surfaces: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- O. Uncoated Steel and Iron Surfaces: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand, power tool, wire brushing or sandblasting; clean by washing with solvent. Apply treatment of phosphoric acid solution,

ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.

- P. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Prime metal items including shop primed items.
- Q. Interior Wood Items Scheduled to Receive Paint Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.
- R. Interior Wood Items Scheduled to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats.
- S. Exterior Wood Scheduled to Receive Paint Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior paintable caulking compound after prime coat has been applied.
- T. Exterior Wood Scheduled to Receive Transparent Finish: Remove dust, grit, and foreign matter; seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes with tinted exterior caulking compound after sealer has been applied.
- U. Glue-Laminated Beams: Prior to finishing, wash surfaces with solvent, remove grease and dirt.
- V. Wood Doors Scheduled for Painting: Seal wood door top and bottom edge surfaces with clear sealer.
- W. Metal Doors Scheduled for Painting: Prime metal door top and bottom edge surfaces.

3.3 APPLICATION

- A. Apply products in accordance with manufacturer's instructions.
- B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- C. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat unless specified otherwise.
- D. Sand wood and metal surfaces lightly between coats to achieve required finish.
- E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- F. Where clear finishes are required, tint fillers to match wood. Work fillers into grain before set. Wipe excess from surface.
- G. Prime concealed surfaces of interior and exterior woodwork with primer paint.
- H. Prime concealed surfaces of interior wood surfaces scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with thinner.
- I. Finishing Mechanical And Electrical Equipment:

- 1. Refer to Section 22 05 53, Section 23 05 53, Section 26 05 53 for schedule of color coding and identification banding of equipment, duct work, piping, and conduit.
- 2. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- 3. Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are shop finished.
- 4. Paint interior surfaces of air ducts visible through grilles and louvers with one coat of flat black paint to visible surfaces. Paint dampers exposed behind louvers, grilles, to match face panels.
- 5. Paint exposed conduit and electrical equipment occurring in finished areas.
- 6. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
- 7. Color code equipment, piping, conduit, and exposed duct work in accordance with requirements indicated. Color band and identify with flow arrows, names, and numbering.
- 8. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.4 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect and test questionable coated areas.

3.5 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Collect waste material which may constitute fire hazard, place in closed metal containers, and remove daily from site.

3.6 SCHEDULE - EXTERIOR SURFACES

- A. Steel - Unprimed:
 - 1. One coat Acrylic Primer
 - a. SW Pro Industrial Pro-Cryl Universal Acrylic Primer (B66-310)
 - 1) Min dft per coat: 2.0-4.0 mils.
 - 2) VOC: 96 g/L
 - 2. Two coats of high-performance acrylic, semi-gloss.
 - a. SW Sher-Cryl High Performance Acrylic Semi-Gloss (B66-350).
 - 1) Min dft per coat: 2.5-4.0 mils.
 - 2) VOC: < 575 g/L
- B. Steel - Shop Primed:
 - 1. One coat Acrylic Primer
 - a. SW Pro Industrial Pro-Cryl Universal Acrylic Primer (B66-310)
 - 1) Min dft per coat: 2.0-4.0 mils.
 - 2) VOC: 96 g/L

2. Two coats of high-performance acrylic, semi-gloss.
 - a. SW Sher-Cryl High Performance Acrylic Semi-Gloss (B66-350).
 - 1) Min dft per coat: 2.5-4.0 mils.
 - 2) VOC: < 200 g/L
- C. Steel - Galvanized:
 1. One coat galvanized metal primer.
 - a. SW DTM Wash Primer (B66W1)
 - 1) Min Dft per coat: 2.5-5.0 mils
 2. Two coats of high-performance acrylic, semi-gloss.
 - a. SW Sher-Cryl High Performance Acrylic Semi-Gloss (B66-350).
 - 1) Min dft per coat: 2.5-4.0 mils.
 - 2) VOC: < 200 g/L

3.7 SCHEDULE - INTERIOR SURFACES

- A. Wood - Painted:
 1. One coat latex primer
 - a. SW ProMar 200 Zero VOC Interior Latex Primer (B28W02600)
 - 1) Min dft per coat: 1.0 mils
 - 2) VOC: 0 g/L
 2. Two coats latex, Eg-Shel.
 - a. SW ProMar 200 Zero VOC Eg-Shel Interior Latex (B20W12651)
 - 1) Min dft per coat: 1.7 mils.
 - 2) VOC: 0 g/L.
- B. Wood - Transparent:
 1. Filler coat (for open grained wood only).
 2. One coat of stain.
 - a. SW Wood Classics Oil Stain (A49-200)
 - 1) Min wft per coat: 3.0 – 3.5 mils.
 - 2) VOC: 525 g/L.
 3. One coat sanding sealer.
 - a. SW Wood Classics Fast Dry Sanding Sealer (B25v43)
 - 1) Min dft per coat: 1.0 – 1.2 mils.
 - 2) VOC: 542 g/L.
 4. One coat of varnish, satin.
 - a. SW Wood Classics Fast Dry Oil Satin Varnish (A66-300)
 - 1) Min dft per coat: 1.3 mils.
 - 2) VOC: 496 g/L.
- C. Concrete, Concrete Block:
 1. One coat acrylic resin surfacer.
 - a. SW PrepRite Interior/Exterior Latex Block Filler (B25W25)
 - 1) Coverage: 75 to 125 sq. ft./gal at 7.7 mil dft.
 - 2) VOC: <0.50 g/L
 2. Two coats latex, Eg-Shel.

- a. SW ProMar 200 Zero VOC Eg-Shel Interior Latex (B20W12651)
 - 1) Min dft per coat: 1.7 mils.
 - 2) VOC: 0 g/L.
- D. Steel - Unprimed:
 1. One coat Acrylic Primer
 - a. SW Pro Industrial Pro-Cryl Universal Acrylic Primer (B66-310)
 - 1) Min dft per coat: 2.0-4.0 mils.
 - 2) VOC: 96 g/L
 - 3) GreenGuard Gold certified.
 2. Two coats of acrylic, semi-gloss.
 - a. SW Pro Industrial Multi-surface Acrylic Semi-Gloss (B66-1550).
 - 1) Min dft per coat: 2.5-4.0 mils.
 - 2) VOC: 1.41 lb/gal.
- E. Steel – Shop Primed:
 1. Touch-up with zinc rich primer.
 - a. SW Zinc Clad XI Water Based Inorganic Zinc Silicate Coating (B69V11/B69D11)
 - 1) Min dft per coat: 3.0-4.0 mils.
 - 2) VOC: 0 lb/gal
 2. Two coats of acrylic, semi-gloss.
 - a. SW Pro Industrial Multi-Surface Acrylic Semi-Gloss (B66-1550).
 - 1) Min dft per coat: 2.5-4.0 mils.
 - 2) VOC: 1.41 lb/gal.
- F. Steel - Galvanized:
 1. One coat galvanized metal primer.
 - a. SW DTM Wash Primer (B66W1)
 - 1) Min Dft per coat: 2.5-5.0 mils
 2. Two coats of acrylic, semi-gloss.
 - a. SW Pro Industrial Multi-Surface Acrylic Semi-Gloss (B66-1550).
 - 1) Min dft per coat: 2.5-4.0 mils.
 - 2) VOC: 1.41 lb/gal.
- G. Gypsum Board (Walls and Ceilings):
 1. One coat latex primer
 - a. SW ProMar 200 Zero VOC Interior Latex Primer (B28W02600)
 - 1) Min dft per coat: 1.0 mils
 - 2) VOC: 0 g/L
 - 3) GreenGuard Gold Certified
 2. Two coats latex, Eg-Shel.
 - a. SW ProMar 200 Zero VOC Eg-Shel Interior Latex (B20W12651)
 - 1) Min dft per coat: 1.7 mils.
 - 2) VOC: 0 g/L.

3.8 COLOR SCHEDULE

- A. Reference Drawings for more information regarding color placement.

END OF SECTION

DIVISION 10

SPECIALTIES

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THE CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, SYSTEMS, EQUIPMENT, ITEMS, ARTICLES, OPERATIONS, AND/OR METHODS LISTED, IMPLIED, MENTIONED, OR SCHEDULED IN THE CONTRACT DOCUMENTS AND/OR NECESSARY AND/OR REQUIRED FOR THE SATISFACTORY COMPLETION OF THE WORK.

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**SECTION 10 14 00
SIGNAGE**

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes interior mounted signs.
- B. Related Sections:
 - 1. Section 04 20 00 – Unit Masonry.
 - 2. Section 10 44 00 Fire Protection Specialties.

1.2 REFERENCES

- A. 2012 Texas Accessibility Standards.

1.3 SUBMITTALS

- A. Product Data:
 - 1. Submit Manufacturer's product data sheets. Include color selector for interior signs.
 - 2. Submit information regarding manufacturer's software and system of color coated, pre-perforated paper sign inserts allowing client to update and maintain signage graphics in-house, to be included as part of the interior signage product.
- B. Shop Drawings: Indicate sign styles, lettering font, artwork, foreground and background colors, locations, overall dimensions of each sign. Shop drawings shall include a signage schedule.
- C. Manufacturer's Installation Instructions: Submit installation template and attachment devices.

1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years' experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Package signs, labeled in name groups.
- C. Store adhesive attachment tape at ambient room temperatures.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not install signs when ambient temperature is lower than recommended by manufacturer.
- C. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.1 INTERIOR SIGNAGE MANUFACTURER

- A. APCO Signs, model Accord15 Modular Sign System as design basis.
 - 1. AC138: 'In Case of Fire Use Fire Exit. Do Not Use Elevator', with symbol graphic.

- 2. AC189: Information sign.

- B. Substitutions: Section 01 60 00 - Product Requirements.

2.2 INTERIOR SIGNAGE COMPONENTS

- A. Materials & Construction:
 - 1. Frames/holders.
 - a. Low-profile injection molded plastic bevel edge profile.
 - b. Plastic edge profiles shall be integrally colored injection molded UV and impact resistant ASA (Acrylonitrile Stryrene Acrylate).
 - c. Sign frames shall feature an overall depth of 5/8 inch or less and must accommodate front-loading, updateable message panels and inserts.
 - d. Color: As selected from manufacturer's standard colors.
 - 2. Message Panels/Inserts
 - a. Material: Solid Color Rigid Photopolymer.
 - b. Thickness: 1/16 inch.
 - c. Color: As selected from manufacturer's standard colors.
 - 3. Background:
 - a. Material: Solid Color Rigid Photopolymer.
 - b. Thickness: 1/16 inch.
 - c. Color: As selected from manufacturer's standard colors.
- B. Individual Graphics
 - 1. Character Font: Helvetica.
 - a. Height: 5/8 inch, uppercase.
 - 2. Graphic Style: Must meet ADA requirements for letter proportions and sizes.
 - 3. Character & Graphics Color: As selected from manufacturer's standard colors.
- C. Braille and Tactile Components
 - 1. PETG-backed photopolymer.
 - 2. Raised characters and Braille minimum 1/32-inch depth/thickness.

2.3 ACCESSORIES

- A. Tape Adhesive: Double sided vinyl tape for indoor signs.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

3.2 INSTALLATION

- A. Install signs after doors and mounting surfaces are finished, in locations indicated on Drawings.

- B. Position sign as indicated in the drawings and level.

3.3 SCHEDULES

- A. Reference drawings for schedule and details.

- B. AC 138: Locate at elevator on hallway side of Floor 1 and Floor 2; Qty – 2; (Refer Alternate #1).
- C. AC 189: Locate adjacent to door at Office 100; Qty – 1.

END OF SECTION

SECTION 10 44 00
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes fire extinguishers and brackets for wall mounting.
- B. Related Sections:
 - 1. Section 06 10 00 – Rough Carpentry: Framing, blocking, and shims for support and alignment of cabinets and brackets.
 - 2. Section 09 21 16 – Gypsum Board assemblies: Wall construction to accept cabinets and brackets.

1.2 REFERENCES

- A. National Fire Protection Association:
 - 1. NFPA 10 - Standard for Portable Fire Extinguishers.
- B. Underwriters Laboratories Inc.:
 - 1. UL - Fire Protection Equipment Directory.

1.3 PERFORMANCE REQUIREMENTS

- A. Conform to NFPA 10 and applicable building/fire code.
- B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc. for purpose specified and indicated.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate wall bracket mounted measurements, location, fire ratings, and anchorage details.
- C. Product Data: Submit extinguisher operational features, color and finish, and anchorage details.
- D. Manufacturer's Installation Instructions: Submit special criteria and wall opening coordination requirements.
- E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Operation and Maintenance Data: Submit test, refill or recharge schedules and re-certification requirements.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not install extinguishers when ambient temperature is capable of freezing extinguisher ingredients.

PART 2 PRODUCTS

2.1 FIRE EXTINGUISHERS

- A. Manufacturers:
 - 1. Amerex Models; B500.
 - 2. JL Industries Models; Cosmic 5E.
 - 3. Larsen's Manufacturing Co. Models; MP5.
 - 4. Nystrom Products Co. Models; EX-3005.
 - 5. Substitutions: Section 01 60 00 - Product Requirements.
- B. Dry Chemical Type: Steel tank, with pressure gage; Class 2A-10B:C.
- C. Extinguisher Finish: Red painted finish.

2.2 ACCESSORIES

- A. Extinguisher Brackets: Formed steel, red enamel finish.
- B. Signage: Surface applied vinyl label in vertical format identifying "Fire Extinguisher".

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

3.2 INSTALLATION

- A. Install wall brackets, maximum 48 inches from finished floor to top of extinguisher handle.
- B. Secure rigidly in place.
- C. Place extinguishers and accessories on wall brackets as scheduled.
- D. Position signage as required by authorities having jurisdiction.

3.3 SCHEDULES

- A. Class 2A-10B:C extinguishers on brackets:
 - 1. Quantity: Two (2).

END OF SECTION

DIVISION 13

SPECIAL CONSTRUCTION

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SECTION 13 34 19

METAL BUILDING SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes pre-engineered, shop fabricated structural steel building frame.

1.2 REFERENCES

- A. American Institute of Steel Construction:
1. AISC S335 - Specification for Structural Steel Buildings Allowable Stress Design, and Plastic Design.
 2. AISC S342L - Load and Resistance Factor Design Specification for Structural Steel Buildings.
 3. AISC S344L - Metric Load and Resistance Factor Design Specification for Structural Steel Buildings.
- B. ASTM International:
1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
 2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 3. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 4. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
 5. ASTM A325 - Standard Specification for Structural Bolts, Steel,

- Heat Treated, 120/105 ksi Minimum Tensile Strength.
6. ASTM A490 - Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength.
 7. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 8. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
 9. ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality.
 10. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
 11. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 12. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 13. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

14.	ASTM C991 - Standard Specification for Flexible Glass Fiber Insulation for Pre-Engineered Metal Buildings.	2.	UL 723 - Tests for Surface Burning Characteristics of Building Materials.
15.	ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).	1.3	SYSTEM DESCRIPTION
16.	ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.	A.	Single span rigid frame.
17.	ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.	1.4	DESIGN REQUIREMENTS
C.	American Welding Society:	A.	Provide drainage to exterior for water entering or condensation occurring within wall or roof system.
1.	AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.	B.	Size and fabricate wall and roof systems free of distortion or defects detrimental to appearance or performance.
2.	AWS D1.1 - Structural Welding Code - Steel.	1.5	PERFORMANCE REQUIREMENTS
D.	Metal Building Manufacturers Association:	A.	Conform to applicable codes for submission of design calculations, reviewed shop and erection drawings, required for acquiring permits.
1.	MBMA - Low Rise Building Systems Manual.	B.	Cooperate with regulatory agency or authority and provide data as requested authority having jurisdiction.
E.	National Fire Protection Association:	1.6	SUBMITTALS
1.	NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.	A.	Section 013300 - Submittal Procedures: Submittal procedures.
F.	SSPC: The Society for Protective Coatings:	B.	Shop Drawings: Indicate assembly dimensions, locations of structural members, connections, attachments, openings, cambers, loads, and reactions; wall and roof system dimensions, panel layout, general construction details, anchorages and method of anchorage, method of installation; framing anchor bolt settings, sizes, and locations from datum, and foundation loads; indicate welded connections with AWS A2.4 welding symbols;
1.	SSPC - Steel Structures Painting Manual.		
2.	SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).		
G.	Underwriters Laboratories Inc.:		
1.	UL - Building Materials Directory.		

indicate net weld lengths;
provide professional seal and
signature.

- C. Erection Drawings: Indicate members by label, assembly sequence, and temporary erection bracing.

PART 2 PRODUCTS

2.1 FABRICATION - FRAMING

- A. Fabricate members in accordance with AISC Specification for plate, bar, tube, or rolled structural shapes.
- B. Provide framing for door window louver skylight, ventilator openings.

PART 3 EXECUTION

3.1 ERECTION - FRAMING

- A. Erect framing in accordance with AISC Specification.
- B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing.
- C. Set column base plates with non-shrink grout to achieve full plate bearing.
- D. Do not field cut or alter structural members without approval of Architect/Engineer.
- E. After erection, prime welds, abrasions, and surfaces not shop primed.

3.2 ERECTION TOLERANCES

- A. Framing Members: 1/4 inch from level; 1/8 inch from plumb.

END OF SECTION

DIVISION 14

CONVEYING EQUIPMENT

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THE CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, SYSTEMS, EQUIPMENT, ITEMS, ARTICLES, OPERATIONS, AND/OR METHODS LISTED, IMPLIED, MENTIONED, OR SCHEDULED IN THE CONTRACT DOCUMENTS AND/OR NECESSARY AND/OR REQUIRED FOR THE SATISFACTORY COMPLETION OF THE WORK.

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SECTION 14 21 23
ELECTRIC TRACTION PASSENGER ELEVATORS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Electric traction passenger elevators.

1.2 RELATED SECTIONS

- A. Section 01 50 00 – Temporary Facilities and Controls: Protection of floor openings and personnel barriers; temporary power and lighting.
- B. Section 04 20 00 – Unit Masonry: Setting sleeves, inserts, and anchoring devices in masonry for guide-rail brackets.
- C. Section 05 12 00 – Structural Steel Framing: Support steel, divider beams, and hoist beams.
- D. Section 05 50 00 – Metal Fabrications: Pit ladders.
- E. Section 06 10 53 – Miscellaneous Rough Carpentry: Temporary platform assembly.
- F. Section 07 16 00 – Cementitious Waterproofing: Waterproofing of elevator pit.
- G. Section 09 90 00 – Paints and Coatings: Field painting of elevator entrances over primer.
- H. Section 28 31 00 – Fire Detection and Alarm: Heat, smoke, and products of combustion sensing devices, fire alarm signal lines to contacts in machine space.
- I. Section 23 00 00 – HVAC: Heating, cooling, and ventilation of control and machinery space.
- J. Section 26 05 00 – Wiring Methods: Light outlets, convenience outlets, light switches, and conduits.
- K. Section 26 24 00 – Switchboards and Panelboards: Disconnect switches.
- L. Section 26 50 00 – Lighting: Light fixtures.
- M. Section 22 14 29 – Sump Pumps: For sump pumps, sumps, and sump covers in elevator pits.
- N. Section 27 15 00 – Communications Horizontal Cabling: For Telephone service for elevators and for Internet connection to elevator controllers

for remote monitoring.

- O. Section 27 30 00 – Telephone and Intercommunication Equipment (Voice Communications): Telephone outlets and elevator telephones.

1.3 REFERENCES

- A. ANSI/ASME A17.1/CAN/CSA B44 – Safety Code for Elevators and Escalators.
- B. ADAAG – Americans with Disabilities Act Accessibility Guidelines.
- C. ANSI/NFPA 70 – National Electrical Code.
- D. ANSI/NFPA 80 – Fire Doors and Windows.
- E. ANSI/UL 10B – Fire Tests of Door Assemblies.
- F. CAN/CSA C22.1 – Canadian Electrical Code.
- G. Model and Local Building Codes
- H. ISO 9001: 2000 - Quality Management Systems - Requirements.

1.4 DESIGN REQUIREMENTS

- A. Arrange elevator components in control closet or machinery space so equipment can be removed for repairs or replaced with minimal disturbance to other equipment and components.
- B. Where permitted by code, provide all elevator equipment including controls, drives, transformers, and rescue features within the elevator hoistway.

1.5 SUBMITTALS

- A. Comply with Section 01 33 00 – Submittal Procedures.
- B. Product Data: Submit manufacturer/installer's product data, including,
 - 1. Descriptive brochures or detail drawings of car and hall fixtures, cab ceilings, and product features.
 - 2. Power Information: Horsepower, starting current, running current, machine and control heat release, and

electrical requirements.

- C. Shop Drawings: Submit manufacturer/installer's shop drawings, including plans, elevations, sections, and details, indicating location of equipment, loads, dimensions, tolerances, materials, components, fabrication, fasteners, hardware, finish, options, accessories, and other information to render totally functional elevators.
- D. Samples: Submit manufacturer/installer's samples of standard colors and finishes of finish materials.
- E. Operation and Maintenance Manual: Submit manufacturer/installer's operation and maintenance manual; including operation, maintenance, adjustment, and cleaning instructions; trouble shooting guide; renewal parts catalogs; and electrical wiring diagrams.
- F. Warranty: Submit manufacturer/installer's standard warranty.

1.6 QUALITY ASSURANCE

- A. Manufacturer/Installer's Qualifications: Specialize in manufacturing and installing elevator equipment, with a minimum of 10 years successful experience.
- B. Regulatory Requirements:
 - 1. Elevator design, clearances, construction, workmanship, materials, and installation, unless specified otherwise, shall be in accordance with ANSI/ASME A17.1, handicap accessibility, Americans with Disabilities Act, and other codes having legal jurisdiction.
 - 2. ANSI/ASME A17.1 shall govern, except where codes having legal jurisdiction include more rigid requirements or conflict with ANSI/ASME A17.1.
 - 3. Elevator shall follow design and manufacturing procedures certified in accordance with ISO 9001-2000 to meet product and service requirements for

quality assurance for new products.

- 4. Where product is in variance to the published ANSI/ASME A17.1 model code, provide a 3rd party AECO certification demonstrating equivalent function, safety, and performance.
- C. Pre-installation Meeting:
 - 1. Convene pre-installation meeting before start of installation of elevators.
 - 2. Require attendance of parties directly affecting work of this section, including Contractor, Architect, and elevator manufacturer/installer.
 - 3. Review examination, installation, field quality control, adjusting, cleaning, protection, and coordination with other work.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer/installer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer/installer.
- B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer/installer's instructions.
- C. Handling: Protect materials during handling and installation to prevent damage.

1.8 PROJECT CONDITIONS

- A. Temporary Electrical Power:
 - 1. Owner will arrange for temporary 220 VAC, single-phase, 60 Hz., GFCI-protected electricity to be available for installation of elevator components.
 - 2. Comply with Section 01 51 00 – Temporary Utilities.
- B. Installation of the Elevator:
 - 1. General Contractor will provide permanent three-phase power prior to installation start.
 - 2. General Contractor will provide clear, rollable access to a 20' x 10' secure and dry

- storage area prior to delivery.
- 3. General Contractor will provide a clean, dry, and complete hoistway along with temporary installation platform and all required OSHA-compliant barricades prior to delivery.
- C. Temporary Use of Elevator:
 - 1. Owner will negotiate with manufacturer/installer for temporary use of elevator, if required.
 - 2. Temporary use of elevator shall be in accordance with terms and conditions of manufacturer/installer's temporary acceptance form.

1.9 SCHEDULING

- A. Coordinate elevator work with work of other trades, for proper time and sequence to avoid construction delays.

1.10 WARRANTY

- A. Manufacturer/installer shall guarantee materials and workmanship of equipment installed under these specifications and make good, defects not due to ordinary wear or to improper use, which may develop within 1 year after completion of installation or acceptance thereof by beneficial use, whichever is earlier.

1.11 MAINTENANCE SERVICE

- A. Elevator maintenance service shall be performed by elevator manufacturer/installer.
- B. Elevators shall receive regular maintenance on each unit for period of 12 months after completion of work specified herein or acceptance thereof by beneficial use, whichever is earlier.
- C. Trained employees shall make periodic examinations and perform work including necessary adjusting, greasing, oiling, and replacing parts to keep elevators in operation, except parts that require replacement because of accidents, vandalism, misuse, or negligence by parties other than

- manufacturer/installer.
- D. Manufacturer/installer shall perform all Work, except emergency minor adjustment call-back service, during regular working hours. Manufacturer/installer shall provide emergency minor adjustment call-back service, during regular working hours.
- E. Should Owner request that examinations, cleaning, lubrication, adjustments, repairs, replacements, or emergency minor adjustment call-back service, unless specified herein, be performed on other than manufacturer/installer's regular working hours of regular working days, manufacturer/installer shall absorb straight-time labor charges and Owner will compensate manufacturer/installer for overtime premium, travel time, and expense at normal billing rates.
- F. Elevator Control System:
 - 1. Include built-in remote diagnostic module to relay constant status of elevators and control system to a 24-hour, 7-days-a-week central-monitoring facility.
 - 2. Remote Monitoring Device: Transmit information on current status of elevators, including malfunctions, system errors, and shutdown.

PART 2 PRODUCTS

2.1 MANUFACTURER/INSTALLER

- A. Schindler Elevator Corporation, Website: www.us.schindler.com.
- B. Elevator shall be installed by elevator manufacturer.

2.2 ELEVATOR SYSTEM AND COMPONENTS

- A. Electric Traction Passenger Elevators: Basis of design is the Schindler 3100 Gearless Traction Elevator.
- B. Elevator Equipment Summary:
 - 1. Application: Machine Room Less (MRL)
 - 2. Counterweight Location: Side
 - 3. Machine Location: Top of the hoistway mounted on car and

- counterweight guide rails
- 4. Control Space Location: Top landing entrance frame or entrance frame at one floor below the top landing
- 5. Service: General Purpose Passenger
- 6. Quantity: 1 Unit
- 7. Capacity: 2100 lbs
- 8. Speed: 100 fpm
- 9. Travel: 24' 0"
- 10. Landings: 2
- 11. Front Openings: 2
- 12. Rear Openings: 0
- 13. Door Hand: Left
- 14. Rear Door Hand: N/A
- 15. Operation: Microprocessor Single Car Automatic Operation
- 16. Clear Inside Dimensions: 5' 9-3/8" Wide X 4' 4-7/8" Deep
- 17. Cab Height: 7' 9"
- 18. Guide Rails: Equivalent to 12 lb. per foot
- 19. Entrance Type and Width: Two Speed Side Opening 3' 0" Wide X 7' 0" High doors
- 20. Entrance Height: 7'-0"
- 21. Power Supply: 208 Volts 3 Phase 60 Hz
- C. Performance:
 - 1. Car Speed: -10% to +5% of contract speed under any loading condition or direction of travel.
 - 2. Car Capacity: Safely lower, stop and hold up to 125% of rated load per code.
- D. Ride Quality:
 - 1. Vertical Vibration (maximum): 25 mg
 - 2. Horizontal Vibration (maximum): 15 mg
 - 3. Vertical Jerk (maximum): 2 ft/sec³
 - 4. Acceleration (maximum): 1.6 ft/sec²
 - 5. In Car Noise: 53-60 dB(A)
 - 6. Stopping Accuracy: ±5mm
 - 7. Starts per hour (maximum): 180
- E. Elevator Operation:
 - 1. Simplex Collective Operation: Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. When all calls

have been answered, the car shall park at the last landing served.

- 2. Group Automatic Operation with Demand-Based Dispatching: Provide reprogrammable group automatic system that assigns cars to hall calls based on a dispatching algorithm designed to minimize passenger waiting time.
- F. Operating Features - Standard:
 - 1. Door Light Curtain Protection
 - 2. Static AC Drive
 - 3. Phase Monitor Relay
 - 4. Cab Overload with Indicator
 - 5. Load-weighing
 - 6. Central Alarm
 - 7. Remote Monitoring
 - 8. Firefighter's Operation
 - 9. Automatic Evacuation
 - a. When the main line power is lost for longer than 5 seconds the emergency battery power supply provides power automatically to the elevator controller. If the car is at a floor when the power fails, it remains at that floor, opens its doors, and shuts down. If the car is between floors, it is raised or lowered to the first available landing, opens its doors, and shuts down.
 - 10. Independent Service

2.3 EQUIPMENT: CONTROL COMPONENTS AND CONTROL SPACE

- A. Controller: Provide microprocessor-based control system to perform all of the functions of safe elevator operation, as well as perform car and group operational control.
 - 1. All high voltage (110v or above) contact points inside the inspection and test panel shall be protected from accidental contact in a situation where the access panels are open.
 - 2. The controller shall be distributed throughout the

elevator system located in the overhead, cab and inspection and test panel. The inverter will be mounted in the overhead adjacent to the hoist machine and an inspection and test panel will be located in the door jamb at the top floor or one floor below the top floor. No elevator equipment mechanical rooms or closets are required.

3. Provide multi-bus control architecture to reduce cabling, material and waste.
- B. Drive: Provide a Variable Voltage Variable Frequency AC Closed Loop drive system. Provide stable start without high peak current, quickly reaching a low energy consumption level.
- C. Inspection and Test Panel: Integrated control equipment, main inspection and test panel in door frame at top level served or at one floor below the top level served.

2.4 EQUIPMENT: HOISTWAY COMPONENTS

- A. Machine:
 1. Gearless asynchronous AC motor with integral drive sheave, service and emergency brakes.
 2. Design machine to enable direct power transfer, thereby avoiding loss of power.
 3. Design machine to be compact, lightweight and durable to optimize material usage and save space.
 4. Mount to structural support channels on top of guide rail system as applicable in hoistway overhead.
- B. Governor:
 1. Tension type over-speed governor with remote manual reset.
 2. Mount to structural support channels as applicable in hoistway overhead.
- C. Buffers, Car and Counterweight: Compression spring type buffers to meet code.
- D. Hoistway Operating Devices:

1. Emergency Stop switch in the pit.
2. Terminal stopping switches.
3. Emergency stop switch on the machine.
- E. Positioning System: System consisting of proximity sensors and door zone vanes.
- F. Guide Rails and Attachments: Provide Tee-section steel rails with brackets and fasteners. Side counterweight arrangements shall have a dual-purpose bracket that combines both counterweight guide rails, and one of the car guide rails to building fastening.
- G. Suspension System: Non-circular Elastomeric coated suspension media with high tensile grade steel cords.
- H. Governor rope: Steel wire rope with 6 mm diameter.

2.5 EQUIPMENT: HOISTWAY ENTRANCES

- A. Hoistway Doors and Frames:
 1. UL rated with required fire rating.
 2. Doors: Rigid flush panel construction with reinforcement ribs.
 3. Frames: Securely fasten at corners to form unit frame. Frames shall be bolted.
- B. Finish:
 1. Exposed Areas of Corridor Frames: Stainless Steel - All Floors
 2. Doors: Stainless Steel - All Floors
 3. Sills: Aluminum - All Floors
- C. Entrance Markings and Jamb Plates: Provide standard entrance jamb tactile markings on both jambs, at all floors. Plate Mounting: Refer to manufacturer drawings.

2.6 EQUIPMENT: CAR COMPONENTS

- A. Car Frame and Safety: Provide car frame with adequate bracing to support the platform and car enclosure. The safety shall be integral to the car frame and shall be flexible guide clamp type.
- B. Platform: Provide platform of steel construction with plywood subfloor and aluminum threshold.
- C. Car Guides: Provide sliding guide

- shoes mounted to top and bottom of both car and counterweight frame. Arrange each guide shoe assembly to maintain constant contact on the rail surfaces. Provide retainers in areas with Seismic design requirements.
- D. Provide central guiding system to reduce mechanical friction and energy consumption.
 - E. Steel Cab:
 1. Fire rating: Provide Class B fire rating for cab, or Class A fire rating where required by local Code.
 2. Design cab to comply with LEED Indoor Environmental Quality requirements through use of Low-Emitting Materials on walls, ceiling and subflooring.
 3. Car wall finish: Steel Painted Finish selected from manufacturer's standard selections.
 4. Base and frieze: Aluminum.
 5. Car front finish: Brushed stainless steel.
 6. Car door finish: Brushed stainless steel.
 7. Ceiling: Canopy ceiling, finished in Painted Silver Metallic With Compact Fluorescent Lighting. Provide lighting consisting of four compact fluorescent energy saving lights located in two semi-oval lateral cutouts located on the center-sides of the cab ceiling, Lexan lens cover.
 8. Handrail: 1-3/8" Round And Curved Brushed Aluminum. Locate on Side Walls.
 9. Flooring: By others. Not to exceed 3/8" finished depth.
 10. Ventilation: Provide one-speed fan in canopy.
 11. Emergency Car Lighting: Provide an emergency power unit employing a 12 volt sealed rechargeable battery and static circuits to illuminate the elevator car and provide current to the alarm bell in the event of building power failure.
 12. Emergency Siren: Provide siren mounted on top of the car that is activated when the Alarm button in the car operating panel is engaged.
 13. Emergency Exit Switch: Provide an electrical contact to open the safety circuit when the emergency car top exit is opened. When the exit door is opened, the top exit switch shall signal the control and the car will be unable to move.
 14. Emergency Exit Lock: Provide an emergency exit lock where required by local code.
 15. Emergency Exit Guard: Provide emergency exit guard on top of car when required for hoistway wall to platform clearance exceeds 12" or for multiple cars in hoistway.

2.7 DOOR OPERATOR AND REOPENING DEVICES

- A. Door Operator: Provide a closed loop VVVF high performance door operator with frequency-controlled drive for fast and reliable operation to open and close the car and hoistway doors simultaneously.
- B. In case of interruption or failure of electric power, the doors can be readily opened by hand from within the car, in accordance with applicable code. Provide emergency devices and keys for opening doors from the landing as required by local code.
- C. Doors shall open automatically when the car has arrived at or is leveling at the respective landings. Doors shall close after a predetermined time interval or immediately upon pressing of a car button. Provide door open button in the car operating panel. Momentary pressing of this button shall reopen the doors and reset the time interval.
- D. Provide door hangers and tracks for each car and hoistway door. Contour tracks to match the hanger sheaves. Design hangers for power operation with provisions

for vertical and lateral adjustment. Hanger sheaves shall have polyurethane tires and pre-lubricated sealed for life bearings.

- E. Electronic Door Safety Device: Equip car doors with concealed transmitter and receiver infrared beam devices to detect presence of object in process of passing through hoistway entrance and car doorway (light curtain device).
 - 1. Use multi-beam scanning without moving parts to detect obstructions in door opening.
 - 2. Detector Device: Prevent doors from closing, or if they have already started closing, cause doors to reopen and remain open while object is within detection zone.
 - 3. Horizontal Beams: Minimum of 33 infra-red beams to fill doorway from ground level to a height of 6 feet.

2.8 EQUIPMENT: SIGNAL DEVICES AND FIXTURES

- A. Car Operating Panel: Provide a car operating panel with all push buttons, key switches and message indicators for elevator operation.
 - 1. Full height car operating panel shall be surface mounted on front return.
 - 2. Comply with handicap requirements.
 - 3. Push Buttons: Mechanical, illuminating using long-lasting LEDs for each floor served.
 - 4. Emergency Buttons: Provide in accordance with code. Emergency alarm button, door open and door close buttons.
- B. Features of the Car Operating Panel Shall Include:
 - 1. Audible chime to signal that the car is either stopping at or passing a floor served by the elevator.
 - 2. Raised markings and Braille provided to the left-hand side of each push button.
 - 3. Car Lantern: Provide LED illuminated car lantern with direction arrows to comply with

local code when hall lanterns are not provided.

- 4. Door open and close push buttons.
 - 5. Firefighter's hat and Phase 2 Key-switch
 - 6. Inspection key-switch.
 - 7. Key-switch for optional Independent Service Operation
 - 8. Illuminated alarm button with raised marking.
 - 9. Elevator Data Plate marked with elevator capacity and car number.
 - 10. Help Button: Activation of help button will initiate two-way communication between car and a location inside the building, switching over to alternate location if call is unanswered, where personnel are available to take the appropriate action. Visual indicators are provided for call initiation and call acknowledgement.
- C. Hall Fixtures: Provide hall fixtures with necessary push buttons and key switches for elevator operation.
 - 1. Push buttons: Metallic tactile push buttons, up button and down button at intermediate floors, single button at each terminal floor.
 - 2. Height: Comply with handicap requirements.
 - 3. Illumination: Illuminating using long-lasting low power LEDs.
 - D. Hall Lanterns and Position Indicators.
 - 1. LED illuminated direction arrows with audible and visible call acknowledgement.
 - E. Hoistway access switches: Provide key-switch at top and/or bottom floor in entrance jamb as required by local code.
 - F. Firefighter's Phase 1 Service: Key switch in brushed stainless steel cover plate.
 - G. Fixture Cover Plates: For push buttons, hall lanterns and position indicators, resistant white back-printed glass, no screws required

for mounting. Provide stainless steel cover plates for Firefighter's Phase I switch and hoistway access switches, with tamper resistant screws in same finish.

- H. Mounting: Mount hall fixtures in entrance frames.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine hoistways, hoistway openings, and pits before starting elevator installation.
- B. Verify hoistway, pit, overhead, and openings are of correct size, within tolerances, and are ready for work of this section.
- C. Verify walls are plumb where openings occur and ready for entrance sill installation. Traditional sill angle or concrete sill support shall not be required.
- D. Verify hoistway is clear and plumb, with variations not to exceed -0 to +1 inch at any point. Verify projections greater than 4" must be beveled not less than 75 degrees from horizontal. No negative tolerance is permitted for minimum hoistway dimensions.
- E. Verify minimum 2-hour fire-resistance rating of hatch walls.
- F. Notify Architect in writing of dimensional discrepancies or other conditions detrimental to proper installation or performance of elevators.
- G. Do not proceed with elevator installation until unsatisfactory conditions have been corrected in a manner acceptable to manufacturer/installer.

3.2 INSTALLATION

- A. Install elevators in accordance with manufacturer/installer's instructions and ANSI/ASME A17.1.
- B. Set entrances in vertical alignment with car openings and aligned

with plumb hoistway lines.

3.3 FIELD QUALITY CONTROL

- A. Perform tests of elevator as required by ANSI/ASME A17.1 and governing codes.

3.4 ADJUSTING

- A. Adjust elevators for proper operation in accordance with manufacturer/installer's instructions.
- B. Adjust elevators for smooth acceleration and deceleration of car so not to cause passenger discomfort.
- C. Adjust doors to prevent opening of doors at landing on corridor side, unless car is at rest at that landing, or is in leveling zone and stopping at that landing.
- D. Adjust automatic floor leveling feature at each floor to within 1/4 inch of landing.
- E. Repair minor damages to finish in accordance with manufacturer/installer's instructions and as approved by Architect.
- F. Remove and replace damaged components that cannot be successfully repaired as determined by Architect.

3.5 CLEANING

- A. Clean elevators promptly after installation in accordance with manufacturer/installer's instructions.
- B. Do not use harsh cleaning materials or methods that could damage finish.

3.6 PROTECTION

- A. Protect installed elevators from damage during construction in accordance with the negotiated temporary use agreement between Owner and manufacturer's installer.

END OF SECTION

DIVISION 21

FIRE PROTECTION

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SECTION 21 13 13
WET-PIPE FIRE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Design, installation and testing shall be in accordance with NFPA 13 except for specified exceptions.
- B. The design and installation of a hydraulically calculated automatic wet system complete and ready for operation, for all portions of the Building, including the mechanical equipment rooms, electrical rooms, small arms storage, and detention cells.

1.2 QUALITY ASSURANCE

- A. Installer Reliability: The installer shall possess a valid State of Texas fire sprinkler contractor's license. The installer shall have been actively and successfully engaged in the installation of commercial automatic sprinkler systems for the past ten years.
- B. Materials and Equipment: All equipment and devices shall be of a make and type listed by UL and approved by FM, or other nationally recognized testing laboratory for the specific purpose for which it is used. All materials, devices, and equipment shall be approved by the architect.
- C. Submittals: Submit as one package, prepared detailed working drawings that are signed by a NICET Level III or Level IV Sprinkler Technician or stamped by a Registered Professional Engineer practicing in the field of Fire Protection Engineering. As Government review is for technical adequacy only, the installer remains responsible for correcting any conflicts with other trades and building construction that arise during installation. Material submittals shall be approved prior to the purchase or delivery to the job site. All submittals shall be in a digital PDF format. Submittals shall include, but not be limited to, the following:
 - 1. Qualifications:
 - a. Provide a copy of the installing contractors fire sprinkler contractor's license.
 - b. Provide a copy of the NICET certification for the NICET Level III or Level IV Sprinkler Technician who prepared and signed the detailed working drawings unless the drawings are stamped by a Registered Professional Engineer practicing in the field of Fire Protection Engineering.

- 2. Drawings: Submit detailed 1/8-inch scale (minimum) working drawings conforming to NFPA 13. Include a site plan showing the piping to the water supply test location. All other trades shall be cross coordinated on final design.
- 3. Manufacturers Data Sheets:
 - a. For backflow preventers, provide flow test curves from UL, FM, or the Foundation for Hydraulic Research and Cross-Connection Control to verify pressure loss calculations.
 - b. Provide for materials and equipment proposed for use on the system. Include listing information and installation instructions in data sheets. Where data sheet describes items in addition to that item being submitted, clearly identify proposed item on the sheet.
- 4. Calculation Sheets: Submit hydraulic calculation sheets in tabular form conforming to the requirements and recommendations of NFPA 13.
- 5. Final Document Submittals: Provide as-built drawings, testing and maintenance instructions. Submittals shall include, but not be limited to, the following:
 - a. One complete set of reproducible as-built drawings showing the installed system with the specific interconnections between the waterflow switch or pressure switch and the fire alarm equipment.
 - b. Complete, simple, understandable, step-by-step, testing instructions giving recommended and required testing frequency of all equipment, methods for testing all equipment, and a complete trouble shooting manual. Provide maintenance instructions on replacing any components of the system including internal parts, periodic cleaning and adjustment of the equipment and components with information as to the address and telephone number of both the manufacturer and the local supplier of each item.
 - c. Material and Testing Certificate: Upon completion of the sprinkler system installation or any partial section of the system, including testing and flushing, provide a copy

- of a completed Material and Testing Certificate as indicated in NFPA 13.
- d. Certificates shall document all parts of the installation.
 - e. Instruction Manual: Provide one copy of the instruction manual covering the system in a flexible protective cover and mount in an accessible location adjacent to the riser.
- D. Design Basis Information: Provide design, materials, equipment, installation, inspection, and testing of the automatic sprinkler system in accordance with the requirements of NFPA 13. Recommendations in appendices shall be treated as requirements.
1. Perform hydraulic calculations in accordance with NFPA 13 utilizing the Area/Density method. Do not restrict design area reductions permitted for using quick response sprinklers throughout by the required use of standard response sprinklers in the areas identified in this section.
 2. Sprinkler Protection: To determining spacing and sizing, apply the following coverage classifications:
 - a. Light Hazard Occupancies: Holding Areas, Offices and Restrooms.
 - b. Ordinary Hazard Group 1 Occupancies: Mechanical Equipment Rooms, Transformer Rooms, Electrical Switchgear Rooms, Electric Closets and Small Arms Storage.
 - c. Ordinary Hazard Group 2 Occupancies: Storage rooms, trash rooms, clean and soiled linen rooms, laundry, kitchens, kitchen storage areas, storage rooms and storage areas
 - d. Request clarification from the Government for any hazard classification not identified.
 3. Hydraulic Calculations: Calculated demand including hose stream requirements shall fall no less than 10 percent below the available water supply curve.
 4. Zoning:
 - a. For each sprinkler zone provide a control valve, flow switch and a test and drain assembly with pressure gauge.
- 1.3 APPLICABLE PUBLICATIONS**
- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
 - B. National Fire Protection Association (NFPA):
 - 13-2016 - Installation of Sprinkler Systems
 - 24-2016 – Private Fire Mains
 - 170-2016 - Fire Safety Symbols
 - C. Underwriters Laboratories, Inc. (UL):
 - Fire Protection Equipment Directory – Latest Edition
 - D. Factory Mutual Engineering Corporation (FM):
 - Approval Guide – Latest Edition
 - E. International Building Code – Latest Edition
 - F. Foundation for Cross-Connection Control and Hydraulic Research-2005
- PART 2 PRODUCTS**
- 2.1 PIPING & FITTINGS**
- A. Sprinkler piping shall be in accordance with NFPA 13.
 - B. Sprinkler system piping shall be black steel schedule 40 for threaded pipes and fittings or schedule 10 for roll-grooved pipes and fittings. Cut grooves or threads are not allowed on schedule 10 pipe.
- 2.2 VALVES**
- A. Valves in accordance with NFPA 13.
 - B. Do not use quarter turn ball valves for 50 mm (2 inch) or larger drain valves.
 - C. The wet system control valve shall be a listed indicating type valve. Control valve shall be UL Listed and FM Approved for fire protection installations. System control valve shall be rated for normal system pressure but in no case less than 175 PSI.
 - D. Alarm valve shall be UL Listed and Factory Mutual Approved. The alarm valve shall be equipped with a removable cover assembly. The alarm valve shall be listed for installation in the vertical or horizontal position. The alarm valve shall be equipped with gauge connections on the system side and supply side of the valve clapper. The alarm valve shall be equipped with an external bypass to eliminate false water flow alarms. The alarm valve trim piping shall be externally galvanized. Maximum water working pressure to 250 PSI.
 - E. Alarm devices shall be connected to a multitone horn/strobe combination designed for use as an audio/visual indicator with separate terminals for the horn and strobe. Refer to manufacturer specifications for wiring information. Device shall be listed for outdoor use and shall be of red with white letter finish.
 - G. Automatic Ball Drips: Cast brass 20 mm (3/4 inch) in-line automatic ball drip with both ends threaded with iron pipe threads.

2.3 FIRE DEPARTMENT SIAMESE CONNECTION

- A. Brass, exterior fire department connection with brass escutcheon plate, and a minimum of two 65 mm (2-1/2 inch) connections threaded to match those on the local fire protection service, with polished brass caps and chains. Provide escutcheon with integral raised letters, "Automatic Sprinkler" "Standpipe and Automatic Sprinkler". Install an automatic ball drip between fire department connection and check valve with drain piping routed to the exterior of the building or a floor drain.

2.4 SPRINKLERS

- A. All sprinklers except "institutional" type sprinklers shall be FM approved. "Institutional" type sprinklers in Holding Units shall be UL listed or FM approved quick response type. Maximum break away strength shall be certified by the manufacturer to be no more than 39 kPa (85 pounds). Provide quick response sprinklers in all areas, except where specifically prohibited by their listing or approval.
 - 1. Reflected Ceiling Sprinklers: Quick response pendant sprinklers with matching chrome escutcheons.
 - 2. Exposed Structure: Quick response upright brass sprinklers.
 - 3. Wall Mounted Sprinklers: Sidewall type sprinkler with matching chrome escutcheon.
- B. Acceptable manufacturer:
 - Tyco
 - Victaulic
 - Reliable
 - Grinnell
 - Viking

2.5 SPRINKLER CABINET

Provide sprinkler cabinet with the required number of sprinkler heads of all ratings and types installed, and a sprinkler wrench for each system. Locate adjacent to the riser. Sprinkler heads shall be installed in center of tile or center to center.

2.6 IDENTIFICATION SIGNS/HYDRAULIC PLACARDS

Plastic, steel or aluminum signs with white lettering on a red background with holes for easy attachment. Enter pertinent data for each system on the hydraulic placard.

2.7 SWITCHES:

- A. Contain in a weatherproof die cast/red baked enamel, oil resistant, aluminum housing with tamper resistant screws, 13 mm (1/2 inch) conduit entrance and necessary facilities for attachment to the valves. Provide two SPDT switches rated at 2.5 amps at 24 VDC.

- B. Water flow Alarm Switches: Vane-type, non-coded, non-accumulative retard and adjustable from 0 to 60 seconds minimum. Set flow switches at an initial setting between 20 and 30 seconds
- C. Pressure Switches: Activation by any flow of water equal to or more than the discharge from one sprinkler. Water Flow Indicating Pressure Switch will activate an alarm by way of an alarm pressure switch. The alarm pressure switch shall be compatible with system devices. The alarm pressure enclosure shall be UL Listed and Factory Mutual Approved for the application in which it is used. The alarm pressure switch shall have the ability to be wired for Class A or Class B service.
- D. Valve Supervisory Switches for Ball and Butterfly Valves: May be integral with the valve.

2.8 WATERFLOW INDICATORS:

Electrically supervised, vane type waterflow detector, rated to 250 psig, and designed for horizontal or vertical installation. Include 2 SPDT (single pole, double throw) circuit switches to provide isolated alarm and auxiliary contacts, 7 ampere, 125-volt A.C. and .25 ampere, 24-volt D.C. complete with factory-set field-adjustable retard element to prevent false signals, and tamper-proof cover that sends a signal when cover is removed. Wiring shall be installed by alarm contractor.

2.9 GAUGES

Provide gauges as required by NFPA 13.

2.10 PIPE HANGERS AND SUPPORTS

Supports, hangers, etc., of an approved pattern placement to conform to NFPA 13. System piping shall be substantially supported to the building structure. The installation of hangers and supports shall adhere to the requirements set forth in NFPA 13, Standard for Installation of Sprinkler Systems. Materials used in the installation or construction of hangers and supports shall be listed and approved for such application. Hangers or supports not specifically listed for service shall be designed and bear the seal of a professional engineer.

2.11 WALL, FLOOR AND CEILING PLATES

Provide chrome plated steel escutcheon plates for exposed piping passing through walls, floors or ceilings.

2.12 ANTIFREEZE SOLUTION

Antifreeze solution shall be compatible with potable water supply in accordance with NFPA 13.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Installation shall be accomplished by the licensed contractor. Provide a qualified technician, experienced in the installation and operation of the type of system being installed, to supervise the installation and testing of the system.
- B. Installation of Piping: Accurately cut pipe to measurements established by the installer and work into place without springing or forcing. In any situation where bending of the pipe is required, use a standard pipe-bending template. Install concealed piping in spaces that have finished ceilings. Where ceiling mounted equipment exists, such as in operating and radiology rooms, install sprinklers so as not to obstruct the movement or operation of the equipment. Sidewall heads may need to be utilized. Locate piping in stairways as near to the ceiling as possible to prevent tampering by Connection: Install and supply in conformance with NFPA 13, locate in a secured area, and discharge to the exterior of the building.
- H. Kitchen Ventilator Hood Fire Protection: Provide piping from the building sprinkler system to the stub-out point on the ventilator control cabinet. Size piping in accordance with manufacturer specifications.
- I. Affix cutout disks, which are created by cutting holes in the walls of pipe for flow switches and non-threaded pipe connections to the respective waterflow switch or pipe connection near to the pipe from where they were cut.
- J. Sleeves: Provide for pipes passing through masonry or concrete. Provide space between the pipe and the sleeve in accordance with NFPA 13. Seal this space with a UL Listed through penetration fire stop material. Where core drilling is used in lieu of sleeves, also seal space. Seal penetrations of walls, floors and ceilings of other types of construction.
- K. Provide pressure gauge at each water flow alarm switch location and at each main drain connection.
- L. For each fire department connection, provide the symbolic sign given in NFPA 170 and locate 2400 to 3000 mm (8 to 10 feet) above each connection location. Size the sign to 450 by 450 mm (18 by 18 inches) with the symbol being at least 350 by 350 mm (14 by 14 inches).
- M. Securely attach identification signs to control valves, drain valves, and test valves. Locate hydraulic placard information signs at each

unauthorized personnel, and to provide a minimum headroom clearance of 2250 mm (seven feet six inches). To prevent an obstruction to egress, provide piping clearances in accordance with NFPA 101.

- C. Welding: Conform to the requirements and recommendations of NFPA 13.
- D. Drains: Pipe drains to discharge at safe points outside of the building or to sight cones attached to drains of adequate size to readily carry the full flow from each drain under maximum pressure. Do not provide a direct drain connection to sewer system or discharge into sinks. Install drips and drains where necessary and required by NFPA 13.
- E. Supervisory Switches: Provide supervisory switches for sprinkler control valves.
- F. Waterflow Alarm Switches: Install waterflow switch and adjacent valves in easily accessible locations.
- G. Inspector's Test

sectional control valve where there is a zone water flow switch.

- N. Repairs: Repair damage to the building or equipment resulting from the installation of the sprinkler system by the installer at no additional expense to the Government.

3.2 INSPECTION AND TEST

- A. Preliminary Testing: Flush newly installed systems prior to performing hydrostatic tests to remove any debris which may have been left as well as ensuring piping is unobstructed. Hydrostatically test system, including the fire department connections, as specified in NFPA 13, in the presence of the Contracting Officers Technical Representative (COTR) or his designated representative. Test and flush underground water line prior to performing these hydrostatic tests.
- B. Final Inspection and Testing: Subject system to tests in accordance with NFPA 13, and when all necessary corrections have been accomplished, advise COTR/Resident Engineer to schedule a final inspection and test. Connection to the fire alarm system shall have been in service for at least ten days prior to the final inspection, with adjustments made to prevent false alarms. Furnish all instruments, labor and materials required for the tests and provide the services of the installation foreman or other competent representative of the installer to perform the tests. Correct deficiencies and retest system as necessary, prior to the final acceptance. Include the operation of all features of the systems under normal operations in test.

3.3 INSTRUCTIONS/TRAINING

Furnish the services of a competent instructor for not less than two hours for instructing personnel in the operation and maintenance

of the system, on the dates requested by the COTR/Resident Engineer.

END OF SECTION

DIVISION 22

PLUMBING

THE AGREEMENT, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, SUPPLEMENTARY CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, AND ALL ADDENDA ARE A PART OF THE CONTRACT. THE CONTRACTOR SHALL CONSULT THEM IN DETAIL FOR INSTRUCTIONS PERTAINING TO THE WORK. THE CONTRACTOR SHALL ALSO CONSULT ALL OTHER DIVISIONS AND SECTIONS OF THE PROJECT MANUAL, AND ALL DRAWINGS IN THE EXECUTION OF THE WORK OF THE CONTRACT.

THE CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, SYSTEMS, EQUIPMENT, ITEMS, ARTICLES, OPERATIONS, AND/OR METHODS LISTED, IMPLIED, MENTIONED, OR SCHEDULED IN THE CONTRACT DOCUMENTS AND/OR NECESSARY AND/OR REQUIRED FOR THE SATISFACTORY COMPLETION OF THE WORK.

THE LISTING OF WORK, REQUIREMENTS, AND PRODUCTS IN THIS SECTION IS NOT INTENDED TO BE CONCLUSIVE. THE CONTRACTOR SHALL CHECK ALL OTHER PARTS OF THE CONTRACT DOCUMENTS AND SHALL PROVIDE ALL MISCELLANEOUS ITEMS OF WORK AND PRODUCTS NECESSARY FOR THE SATISFACTORY COMPLETION OF THE WORK DESCRIBED IN THE CONTRACT DOCUMENTS.

**SECTION 22 01 00
SUMMARY OF PLUMBING WORK**

PART 1 - GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

- A. The following Summary of Work is intended as an aid to achieve an understanding of the various elements of work included in the project, as is not intended to be all-inclusive. Detailed descriptions of work and requirements are given in drawings and specifications.
- B. Plumbing Contract Documents were prepared for the Project by:

Trinity MEP Engineering, LLC
3533 Moreland Dr. Ste. A
Weslaco, Texas 78596
Phone Number: (956) 973-0500
Contact Person: Leonardo Munoz, P.E.

- C. General Scope of Work:

1. Install systems and equipment as shown on the contract documents. Refer to drawings for schedule of equipment that will be installed. After installing equipment, connect all water, sewer, and/or power to fixtures.
2. Provide all materials and labor associated with a complete operational installation of new systems including, but not limited to:
 - Fixtures for facility
 - Piping for Sanitary Sewer and Vent Systems
 - Piping for Domestic water and Hot Water Systems.

1.2 COORDINATION

- A. All plumbing work shall be done under sub-contract to a General Contractor. Plumbing Contractor shall coordinate all work through General Contractor, even in areas where only plumbing work is to take place.
- B. Coordination between all trades shall take place on a regular basis to avoid conflicts between disciplines and equipment clearances.
- C. Work shall take place with minimal disruption to Owner's operations in areas surrounding the new building.
- D. Cooperate fully with other contractors so that work under those contracts may be carried out smoothly, without interfering with or delaying work under this Contract.

- E. Fully coordinate with electrical contractor for providing power to plumbing equipment.

1.3 UTILITIES

1. Coordinate with power, water, telephone, cable and gas utilities to locate all utilities prior to digging in any area.
2. Obtain any approvals required from utilities to relocate utilities.
3. Cost of relocating or bypassing utilities indicated on drawings shall be included in Base Bid.

1.4 CONTRACTOR USE OF PREMISES

- A. Use of the Site: Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.
1. Owner Occupancy: Allow for Owner occupancy and use by the public.
 2. Driveways and Entrances: Keep driveways and entrances serving the premises, clear and available to the Owner, the Owner's employees, and emergency vehicles at all time. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- B. Site Safety: Take every precaution to ensure the site does not present a threat to the safety of occupants and/or workers. Minimal safety requirements include, but are not limited to the following:
1. Temporary fencing around construction areas.
 2. Yellow caution tape and construction barricades along open trenches during the day. Trenches shall be covered at night and warning lights provided on construction barricades.
 3. Temporary fencing around equipment while site work is in progress.

1.5 SUBMITTALS

1. All equipment and fixtures shall be provided with a submittal.
2. To expedite the submittal process more efficiently, DO NOT piece-meal the submittals. Submit entire plumbing or in a bound enclosure. This will eliminate delays in the submittal process.

END OF SECTION

**SECTION 22 05 01
COMMON PLUMBING REQUIREMENTS**

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Common requirements and procedures for plumbing systems.
 - 2. Responsibility for proper operation of electrically powered equipment furnished under this Division.
 - 3. Furnish and install sealants relating to installation of systems installed under this Division.
 - 4. Furnish and install Firestop Penetration Systems for plumbing systems penetrations as described in Contract Documents.
- B. Products Furnished But Not Installed Under This Section:
 - 1. Sleeves, inserts, supports, and equipment for plumbing systems installed under other Sections.

1.2 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's catalog data for each manufactured item.
 - 1) Provide section in submittal for each type of item of equipment. Include Manufacturer's catalog data of each manufactured item and enough information to show compliance with Contract Document requirements. Literature shall show capacities and size of equipment used and be marked indicating each specific item with applicable data underlined.
 - 2) Include name, address, and phone number of each supplier.
- B. Informational Submittals:
 - 1. Qualification Statement:
 - a. Plumbing Subcontractor:
 - 1) Provide Qualification documentation if requested by Architect or Owner.
 - b. Installer:
 - 1) Provide Qualification documentation if requested by Architect or Owner.
- C. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Operations and Maintenance Data (Modify and add to requirements of Section 01 7800):

- 1) At beginning of PLUMBING section of Operations And Maintenance Manual, provide master index showing items included:
 - a) Provide name, address, and phone number of Architect, Architect's Mechanical Engineer, General Contractor, and Plumbing subcontractor.
 - b) Identify maintenance instructions by using same equipment identification used in Contract Drawings. Maintenance instructions shall include:
 - (1) List of plumbing equipment used indicating name, model, serial number, and nameplate data of each item together with number and name associated with each system item.
 - (2) Manufacturer's maintenance instructions for each piece of plumbing equipment installed in Project. Instructions shall include name of vendor, installation instructions, parts numbers and lists, operation instructions of equipment, and maintenance instructions.
 - c) Provide operating instructions to include:
 - (1) General description of fire protection system.

- (2) Step by step procedure to follow for shutting down system or putting system into operation.

b. Warranty Documentation:

- 1) Include copies of warranties required in individual Sections of Division 22.

1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 1. Perform work in accordance with applicable provisions of Plumbing Codes applicable to Project. Provide materials and labor necessary to comply with rules, regulations, and ordinances.
 2. In case of differences between building codes, laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Notify Architect in writing of such differences before performing work affected by such differences.
 3. Identification:
 - a. Motor and equipment name plates as well as applicable UL / ULC and AGA / CGA labels shall be in place when Project is turned over to Owner.
- B. Qualifications.
 1. Plumbing Subcontractor:
 - a. Company specializing in performing work of this section.
 - 1) Minimum five (5) years experience in plumbing installations.
 - 2) Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
 - b. Upon request, submit documentation.
 2. Installer:
 - a. Licensed for area of Project.
 - b. Designate one (1) individual as project foremen who shall be on site at all times during installation and experienced with installation procedures required for this project.
 - c. Upon request, submit documentation.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 1. Accept valves on site in shipping containers with labeling in place.
 2. Provide temporary protective coating on cast iron and steel valves.
 3. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- B. Storage And Handling Requirements:
 1. In addition to requirements specified within, stored material shall be readily

accessible for inspection by Architect/engineer until installed.

2. Store items subject to moisture damage in dry, heated spaces.

1.5 WARRANTY

- A. Manufacturer Warranty:
 1. Provide certificates of warranty for each piece of equipment made out in favor of Owner.
- B. Special Warranty:
 1. Guarantee plumbing systems to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.
 2. If plumbing sub-contractor with offices located more than **150 miles (240 km)** from Project site is used, provide service / warranty work agreement for warranty period with local plumbing sub-contractor approved by Architect. Include copy of service / warranty agreement in warranty section of Operation And Maintenance Manual.

PART 2 - PRODUCTS

2.1 COMPONENTS

- A. Components shall bear Manufacturer's name and trade name. Equipment and materials of same general type shall be of same make throughout work to provide uniform appearance, operation, and maintenance.
- B. Pipe And Pipe Fittings:
 1. Weld-O-Let and Screw-O-Let fittings are acceptable.
 2. Use domestic made pipe and pipe fittings on Project, except non-domestic made cast iron pipe and fittings by MATCO-NORCA are acceptable.
- C. Sleeves:
 1. General:
 - a. Two sizes larger than bare pipe or insulation on insulated pipe.
 2. In Concrete And Masonry:
 - a. Sleeves through outside walls, interior shear walls, and footings shall be schedule 80 black steel pipe with welded plate.
 3. In Framing And Suspended Floor Slabs:
 - a. Standard weight galvanized iron pipe, Schedule 40 PVC, or **14 ga (2 mm)** galvanized sheet metal.
- D. Valves:
 1. Valves of same type shall be of same manufacturer.

PART 3 - EXECUTION

3.1 INSTALLERS

- A. Acceptable Installers:

3.2 Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

3.3 EXAMINATION

- A. Drawings:

1. Plumbing Drawings show general arrangement of piping, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.
 2. Consider Architectural and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over Plumbing Drawings.
 3. Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.
- B. Verification Of Conditions:
1. Examine premises to understand conditions that may affect performance of work of this Division before submitting proposals for this work. Examine adjoining work on which plumbing work is dependent for efficiency and report work that requires correction.
 2. Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.
 3. Check that slots and openings provided under other Divisions through floors, walls, ceilings, and roofs are properly located. Perform cutting and patching caused by neglecting to coordinate with Divisions providing slots and openings at no additional cost to Owner.

3.4 No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.

3.5 PREPARATION

- A. Demolition Requirements:
- B. Changes Due To Equipment Selection:
1. Where equipment specified or otherwise approved requires different arrangement or connections from that shown in Contract Documents, submit drawings showing proposed installations.
 2. If proposed changes are approved, install equipment to operate properly and in

harmony with intent of Contract Documents. Make incidental changes in piping, ductwork, supports, installation, wiring, heaters, panelboards, and as otherwise necessary.

3. Provide additional motors, valves, controllers, fittings, and other equipment required for proper operation of systems resulting from selection of equipment.
4. Be responsible for proper location of rough-in and connections provided under other Divisions.

3.6 INSTALLATION

- A. Interface With Other Work:
1. Furnish exact location of electrical connections and complete information on motor controls to installer of electrical system.
 2. Furnish sleeves, inserts, supports, and equipment that are to be installed by others in sufficient time to be incorporated into construction as work proceeds. Locate these items and confirm that they are properly installed.
 3. Furnish inserts for attaching hangers that are to be cast in concrete floor construction at time floors are poured.
- B. Cut carefully to minimize necessity for repairs to previously installed or existing work. Do not cut beams, columns, or trusses.
- C. Locating Equipment:
1. Arrange pipes and equipment to permit ready access to valves, cocks, unions, traps, and to clear openings of doors and access panels.
 2. Adjust locations of pipes, equipment, and fixtures to accommodate work to interferences anticipated and encountered.
 3. Install plumbing work to permit removal of equipment and parts of equipment requiring periodic replacement or maintenance without damage to or interference with other parts of equipment or structure.
 4. Determine exact route and location of each pipe before fabrication.
 - a. Right-Of-Way:
 - 1) Lines that pitch shall have right-of-way over those that do not pitch. For example, plumbing drains shall normally have right-of-way.
 - 2) Lines whose elevations cannot be changed shall have right-of-way over lines whose elevations can be changed.
 - b. Offsets, Transitions, and Changes in Direction:
 - 1) Make offsets, transitions, and changes in direction in pipes as required to maintain proper head

- room and pitch of sloping lines whether or not indicated on Drawings.
- 2) Furnish and install all traps, air vents, sanitary vents, and devices as required to effect these offsets, transitions, and changes in direction.
- D. Penetration Firestops:
1. Install Penetration Firestop System appropriate for penetration at plumbing systems penetrations through walls, ceilings, roofs, and top plates of walls.
- E. Sealants:
1. Seal openings through building exterior caused by penetrations of elements of plumbing systems.
 2. Furnish and install acoustical sealant to seal penetrations through acoustically insulated walls and ceilings.
- F. Furnish and install complete system of piping, valved as indicated or as necessary to completely control entire apparatus:
1. Pipe drawings are diagrammatic and indicate general location and connections. Piping may have to be offset, lowered, or raised as required or directed at site. This does not relieve this Division from responsibility for proper installation of plumbing systems.
 2. Arrange piping to not interfere with removal of other equipment, ducts, or devices, or block access to doors, windows, or access openings:
 - a. Arrange so as to facilitate removal of tube bundles.
 - b. Provide accessible flanges or ground joint unions, as applicable for type of piping specified, at connections to equipment and on bypasses.
 - 1) Make connections of dissimilar metals with di-electric unions.
 - 2) Install valves and unions ahead of traps and strainers. Provide unions on both sides of traps.
 - c. Do not use reducing bushings, bull head tees, close nipples, or running couplings. Street elbows are allowed only on potable water pipe **3/4 inch (19 mm)** in diameter and smaller.
 - d. Install piping systems so they may be easily drained
 - e. Install piping to insure noiseless circulation.
 - f. Place valves and specialties to permit easy operation and access. Valves shall be regulated, packed, and glands adjusted at completion of work before final acceptance.
 3. Do not install piping in shear walls.
4. Cut piping accurately to measurements established at site. Remove burr and cutting slag from pipes.
 5. Work piping into place without springing or forcing. Make piping connections to pumps and other equipment without strain at piping connection. Remove bolts in flanged connections or disconnect piping to demonstrate that piping has been so connected, if requested.
 6. Make changes in direction with proper fittings.
 7. Expansion of Thermoplastic Pipe:
 - a. Provide for expansion in every **30 feet** of straight run.
 - b. Provide **12 inch** offset below roof line in each vent line penetrating roof.
 8. Expansion of PEX Pipe: Allow for expansion and contraction of PEX pipe as recommended by Pipe Manufacturer.
- G. Sleeves:
1. Do not place sleeves around soil, waste, vent, or roof drain lines passing through concrete slabs on grade (unless noted on plans).
 2. Provide sleeves around pipes passing through concrete or masonry floors, walls, partitions, or structural members. Seal sleeves with specified sealants. Follow Pipe Manufacturer's recommendations for PEX pipe (if used) penetrations through studs and floor slabs.
 3. Sleeves through floors shall extend **1/4 inch** above floor finish in mechanical equipment rooms above basement floor. In other rooms, sleeves shall be flush with floor.
 4. Sleeves through floors and foundation walls shall be watertight.
- H. Escutcheons:
1. Provide spring clamp plates where pipes run through walls, floors, or ceilings and are exposed in finished locations of building. Plates shall be chrome plated heavy brass of plain pattern and shall be set tight on pipe and to building surface.
- 3.7 REPAIR / RESTORATION**
- A. Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it:
1. Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown.
 2. Surface finishes shall exactly match existing finishes of same materials.
- 3.8 FIELD QUALITY CONTROL**
- A. Field Tests:

1. Perform tests on plumbing piping systems. Furnish devices required for testing purposes.
- B. Non-Conforming Work:
 1. Replace material or workmanship proven defective with sound material at no additional cost to Owner.
 2. Repeat tests on new material, if requested.

3.9 CLEANING

- A. Remove dirt, grease, and other foreign matter from each length of piping before installation:
 1. After each section of piping used for movement of water or steam is installed, flush with clean water, except where specified otherwise.
 2. Arrange temporary flushing connections for each section of piping and arrange for flushing total piping system.
 3. Provide temporary cross connections and water supply for flushing and drainage and remove after completion of work.

- B. Clean exposed piping, equipment, and fixtures. Remove stickers from fixtures and adjust flush valves.

3.10 CLOSEOUT ACTIVITIES

- A. Instruction of Owner:
 1. Instruct building maintenance personnel in operation and maintenance of plumbing systems utilizing Operation And Maintenance Manual when so doing.
 2. Conduct instruction period after Substantial Completion inspection when systems are properly working and before final payment is made.

3.11 PROTECTION

- A. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system. Cap or plug open ends of pipes and equipment to keep dirt and other foreign materials out of system. Do not use plugs of rags, wool, cotton waste, or similar materials.

END OF SECTION

SECTION 22 05 29
HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Common hanger and support requirements and procedures for plumbing systems.
- B. Products Installed But Not Furnished Under This Section:
 - 1. Paint identification for gas piping used in HVAC equipment.

1.2 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's catalog data for each manufactured item.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Anvil International,
 - b. Cooper B-Line,
 - c. Unistrut, Wayne,
- B. Materials:
 - 1. Hangers, Rods, And Inserts
 - a. Galvanized and UL approved for service intended.
 - b. Support horizontal piping from hangers or on roller assemblies with channel supports, except where trapeze type hangers are explicitly shown on Drawings. Hangers shall have double nuts.
 - 1) Support insulated pipes **2 inches** in diameter and smaller with adjustable swivel ring hanger with insulation protection shield. Gauge and length of shield shall be in accordance with Anvil design data.
 - 2) Type Two Acceptable Products:
 - (1) Swivel Ring Hanger: Anvil Fig. 69.
 - (2) Insulation Protection Shield: Anvil Fig. 167.
 - (3) Equals by

Rod Diameter	Pipe Size
3/8 inch	2 inches and smaller
1/2 inch	2-1/2 to 3-1/2 inches
5/8 inch	4 to 5 inches
3/4 inch	6 inches
7/8 inch	8 to 12 inches

Cooper B-Line.

- 3) Support insulated pipes **2-1/2 inches** in diameter and larger with clevis

hanger or roller assembly with an insulation protection shield. Gauge and length of shield shall be according to Anvil design data.

- a) Type Two Acceptable Products:
 - (1) Clevis Hanger: Anvil Fig. 260.
 - (2) Roller Assembly: Anvil Fig. 171.
 - (3) Insulation Protection Shield: Anvil Fig. 167.
 - (4) Equals by Cooper B-Line.
- 4) Support uninsulated copper pipe **2 inches** in diameter and smaller from swivel ring hanger, copper plated and otherwise fully suitable for use with copper tubing. Support non-copper uninsulated pipes from swivel ring hanger.
 - a) Type Two Acceptable Products:
 - (1) Swivel Ring Hanger For Copper Pipe: Anvil Fig. CT-69.
 - (2) Swivel Ring Hanger For Other Pipe: Anvil Fig. 69.
 - (3) Equals by Cooper B-Line.
- 5) Support uninsulated copper pipe **2-1/2 inches** in diameter and larger from clevis hanger, copper plated hangers and otherwise fully suitable for use with copper tubing. Support non-copper uninsulated pipes from clevis hanger.
 - a) Type Two Acceptable Products:
 - (1) Clevis Hanger For Copper Pipe: Anvil Fig. CT-65.
 - (2) Clevis Hanger For Other Pipe: Anvil Fig. 260.
 - (3) Equals by Cooper B-Line.
- c. Support rods for single pipe shall be in accordance with following table:
- d. Support rods for multiple pipe supported on steel angle trapeze

hangers shall be in accordance with following table:

Rods		Number of Pipes per Hanger for Each Pipe Size						
Number	Diameter	2 Inch	2.5 Inch	3 Inch	4 Inch	5 Inch	6 Inch	8 Inch
2	3/8 Inch	Two	0	0	0	0	0	0
2	1/2 Inch	Three	Three	Two	0	0	0	0
2	5/8 Inch	Six	Four	Three	Two	0	0	0
2	5/8 Inch	Nine	Seven	Five	Three	Two	Two	0
2	5/8 Inch	Twelve	Nine	Seven	Five	Three	Two	Two

- 1) Size trapeze angles so bending stress is less than 10,000 psi
- e. Riser Clamps For Vertical Piping:
 - 1) Type Two Acceptable Products:
 - a) Anvil Fig. 261.
 - b) Equals by Cooper B-Line.
 - f. Concrete Inserts:
 - 1) Individual Inserts:
 - a) Suitable for special nuts size 3/8 inch through 7/8 inch with yoke to receive concrete reinforcing rods, and with malleable iron lugs for attaching to forms.
 - b) Type Two Acceptable Products:
 - (1) Anvil Fig. 282.
 - (2) Equals by Cooper B-Line.
 - 2) Continuous Inserts:
 - a) Class Two Quality Standard: Equal to Unistrut P-3200 series.
 - g. Steel Deck Bracket:
 - 1) Class Two Quality Standard: Equal to Unistrut P1000 with clamp nut, minimum 6 inch length.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Interface With Other Work: If project contains concrete structural system.
 1. Furnish inserts for attaching hangers that are to be cast in concrete floor construction at time floors are poured.
- B. Piping:

1. Properly support piping and make adequate provisions for expansion, contraction, slope, and anchorage.
 - a. Except for underground pipe, suspend piping from roof trusses or clamp to vertical walls using Unistrut and clamps. Do not hang pipe from other pipe, equipment, or ductwork. Laying of piping on any building element is not allowed.
 - b. Supports For Horizontal Piping:
 - 1) Support metal piping at 96 inches on center maximum for pipe 1-1/4 inches or larger and 72 inches on center maximum for pipe 1-1/8 inch or less.
 - 2) Support thermoplastic pipe at 48 inches on center maximum.
 - 3) Support PEX pipe at 32 inches minimum on center.
 - 4) Provide support at each elbow. Install additional support as required.
 - c. Supports for Vertical Piping:
 - 1) Place riser clamps at each floor or ceiling level.
 - 2) Securely support clamps by structural members, which in turn are supported directly from building structure.
 - 3) Provide clamps as necessary to brace pipe to wall.
 - d. If Structural concrete systems are used: Install supports from inserts cast into concrete floor system, including concrete joists and floor slabs. Where inserts cannot be used, provide expansion shields and support hangers from angles held in place by expansion bolts, never directly from expansion bolt itself. Provide calculations necessary to determine number of expansion bolts required to equal capacity of cast-in-place insert.
 - e. Attach Unistrut to structural steel roof supporting structure. Spacing and support as described above.
 - f. Insulate hangers for copper pipe from piping by means of at least two layers of Scotch 33 plastic tape.
2. Gas piping Identification:
 - a. Apply paint identification for gas piping used with HVAC equipment as specified in Section 23 0553.

END OF SECTION

SECTION 22 05 53
IDENTIFICATION FOR PLUMBING PIPES AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
1. Furnish and install identification of plumbing piping and equipment as described in Contract Documents.

PART 2 - PRODUCTS

2.1 SYSTEM

- A. Materials:
1. Labels:
 - a. Equipment Identification:
 - 1) Black formica, with white reveal when engraved.
 - 2) Lettering to be 3/16 inch high minimum.
 2. Paint:
 - a. One Coat Primer:
 - 1) 6-2 Quick Drying Latex Primer Sealer over fabric covers.
 - 2) 6-205 Metal Primer under dark color paint.
 - 3) 6-6 Metal Primer under light color paint.
 - b. Finish Coats: Two coats 53 Line Acrylic Enamel.
 - c. Type Two Acceptable Products.
 - 1) Paint of equal quality from following Manufacturers may be submitted for Architect's approval before use. Maintain specified colors, shades, and contrasts.
 - a) Benjamin Moore,
 - b) ICI Dulux,
 - c) Sherwin Williams,

PART 3 - EXECUTION

3.1 APPLICATION

- A. Labels:

1. Identify following items with specified labels fastened to equipment with screws (unless noted otherwise):
 2. Water Heaters.
 3. Engrave following data from Equipment Schedules on Drawings onto labels:
 - a. Equipment mark.
 - b. Room(s) served.
 - c. Panel and breaker from which unit is powered.
- B. Painting:
1. Only painted legends, directional arrows, and color bands are acceptable.
 2. Locate identifying legends, directional arrows, and color bands at following points on exposed piping of each piping system:
 - a. Adjacent to each item of equipment.
 - b. At point of entry and exit where piping goes through wall.
 - c. On each riser and junction.
 - d. Every 25 feet on long continuous lines.
 - e. Stenciled symbols shall be one inch high and black.

3.2 ATTACHMENTS

- A. Schedules:
1. Pipe Identification Schedule:
 - a. Apply stenciled symbols as follows:

Pipe Use	Abbreviation
Domestic Cold Water	CW
Domestic Hot Water	HW

END OF SECTION

SECTION 22 07 19
PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Furnish and install insulation on hot and cold water lines, fittings, valves, and accessories as described in Contract Documents.
 - 2. Furnish and install insulation on roof drain piping as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 22 1116: 'Domestic Water Piping'.
 - 2. Section 22 1400: 'Facility Storm Drainage'. (if provided on plans)

1.2 SUBMITTALS

- A. Informational Submittals:
 - 1. Identify thermal conductivity, thickness, and jackets (both factory and field applied, if any), for each type of product indicated.

1.3 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this Section according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.
 - 1. Insulation Installed Indoors: Flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread rating of 75 or less, and smoke-developed rating of 150 or less.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Ship insulation materials in containers marked by manufacturer with appropriate ASTM specification designation, type and grade, and maximum use temperature.

Service Water Temperature	Pipe Sizes		
	Up to 1-1/4 In	1-1/2 to 2 In	Over 2 In
170 - 180 Deg F	One In	1-1/2 In	2 In
140 - 160 Deg F	1/2 In	One In	1-1/2 In
45 - 130 Deg F	1/2 In	1/2 In	One In

1.5 COORDINATION

- A. Coordinate size and location of supports, hangers, and insulation shields specified Section "Hangers and Supports."
- B. Coordinate clearance requirements with piping Installer for insulation application.
- C. Coordinate installation and testing of steam or electric heat tracing.

1.6 SCHEDULING

- A. Schedule insulation application after testing piping systems and, where required, after installing and testing heat-trace tape. Insulation application may begin on segments of piping that have satisfactory test results.

PART 2 - PRODUCTS

2.1 COMPONENTS

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Armacell, Mebane, NC
www.armacell.com.
 - b. Childers Products Co, Eastlake, OH
www.fosterproducts.com.
 - c. IMCOA, Youngsville, NC
www.nomacokflex.com.
 - d. Johns-Manville, Denver, CO
www.jm.com.
 - e. Knauf, Shelbyville, IN
www.knauffiberglass.com.
 - f. Manson, Brossard, PQ, Canada
www.isolationmanson.com.
 - g. Nomaco Inc, Yopungsville, NC
www.nomacokflex.com.
 - h. Owens-Corning, Toledo, OH
www.owenscorning.com.
 - i. Speedline Corp, Solon, OH
www.speedlinepvc.com.
 - j. CertainTeed Manson.
 - k. Knauf FiberGlass GmbH.
 - l. Owens-Corning Fiberglas Corp.
 - m. Schuller International, Inc.
 - n. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.
 - o. Armstrong World Industries, Inc.
 - p. Rubatex Corp.
- B. Materials:
 - 1. Above Grade Metal Piping:
 - a. Insulation For Piping:
 - 1) Snap-on glass fiber or melamine foam pipe insulation, or heavy density pipe insulation with factory vapor jacket.
 - 2) Insulation Thickness:
 - 3) Performance Standards: Fiberglas ASJ by Owens-Corning.
 - 4) Type One Acceptable Manufacturers:
 - a) Childers Products.
 - b) Knauf.
 - c) Manson.
 - d) Owens-Corning.
 - e) Johns-Manville.

- f) Equal as approved by Architect before bidding. See Section 01 6200.
- b. Fitting, Valve, And Accessory Covers:
 - 1) PVC.
 - 2) Performance Standard: Zeston by Johns-Manville.
 - 3) Type One Acceptable Manufacturers:
 - a) Knauf.
 - b) Speedline.
 - c) Johns-Manville.
 - d) Equal as approved by Architect before bidding. See Section 01 6200.
- 2. Below Grade Metal Piping:
 - a. Insulation:
 - 1) **1/2 inch (13 mm)** thick.
 - 2) Category Four Acceptable Products. See Section 01 6200 for definition of Categories:
 - a) SS Tubolit by Armacell.
 - b) ImcoLock by Imcoa.
 - c) Nomalock or Therma-Cel by Nomaco.
 - b. Joint Sealant:
 - 1) Category Four Acceptable Products. See Section 01 6200 for definition of Categories:
 - a) Armacell 520.
 - b) Nomaco K-Flex R-373.
- 3. Pex Piping, Above And Below Grade:
 - a. Insulation:
 - 1) **1/2 inch (13 mm)** thick.
 - 2) Category Four Acceptable Products. See Section 01 6200 for definition of Categories:
 - a) SS Tubolit
 - b) by Armacell.
 - c) ImcoLock by Imcoa.
 - d) Nomalock or Therma-Cel by Nomaco.
 - b. Joint Sealant:
 - 1) Category Four Acceptable Products. See Section 01 6200 for definition of Categories:
 - a) Armacell 520.
 - b) Nomaco K-Flex R-373.
 - c)
- 4. PP-R Piping, Above And Below Grade:
 - a. Insulation:
 - 1) **1/2 inch (13 mm)** thick.
 - 2) Category Four Acceptable Products. See Section 01 6200 for definition of Categories:
 - a) SS Tubolit by Armacell.
 - b) ImcoLock by Imcoa.

- c) Nomalock or Therma-Cel by Nomaco.
- b. Joint Sealant:
 - 1) Category Four Acceptable Products. See Section 01 6200 for definition of Categories:
 - a) Armacell 520.
 - b) Nomaco K-Flex R-373.
- 5. PVC or ABS Piping, Above And Below Grade - Facility Storm Drain:
 - a. Insulation:
 - 1) **1/2 inch (13 mm)** thick.
 - 2) Category Four Acceptable Products. See Section 01 6200 for definition of Categories:
 - a) SS Tubolit by Armacell.
 - b) ImcoLock by Imcoa.
 - c) Nomalock or Therma-Cel by Nomaco.
 - b. Joint Sealant:
 - 1) Category Four Acceptable Products. See Section 01 6200 for definition of Categories:
 - a) Armacell 520.
 - b) Nomaco K-Flex R-373.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Above Grade Piping:
 - 1. Apply insulation to clean, dry piping with joints tightly butted.
 - 2. Install insulation in manner to facilitate removal for repairs. Place sections or blocks so least possible damage to insulation will result from inspection or repairs of piping or equipment.
 - 3. Piping up to **1-1/4 inch** Diameter:
 - a. Adhere 'factory applied vapor barrier jacket lap' smoothly and securely at longitudinal laps with white vapor barrier adhesive.
 - b. Adhere **3 inch** wide self-sealing butt joint strips over end joints.
 - 4. Piping **1-1/2 inches** Diameter And Larger:
 - a. Use broken-joint construction in application of two-layer covering.
 - b. Fill cracks and depressions with insulating cement mixed to thick plastic paste.
 - 1) Apply by hand in several layers to make up total specified thickness.
 - 2) Final layer shall have smooth uniform finish before application of covering.
 - 5. Fittings, Valves, And Accessories:
 - a. Do not apply insulation over flanged joints or victaulic couplings until piping has been brought up to operating temperature and flange bolts have been fully tightened. Insulate valves so wheel, stem, and packing nut are exposed.

- b. Insulate with same type and thickness of insulation as pipe, with ends of insulation tucked snugly into throat of fitting and edges adjacent to pipe insulation tufted and tucked in.
- c. Piping Up To **1-1/4 Inch** Diameter:
 - 1) Cover insulation with one piece fitting cover secured by stapling or taping ends to adjacent pipe covering.
 - 2) Alternate Method:
 - a) Insulate fittings, valves, and accessories with one inch of insulating cement and vapor seal with two **1/8 inch** wet coats of vapor barrier mastic reinforced with glass fabric extending **2 inches** onto adjacent insulation.
- d. Piping **1-1/2 inches To 2 Inches** :
 - 1) Insulate with hydraulic setting insulating cement or equal, to thickness equal to adjoining pipe insulation.
 - 2) Apply final coat of fitting mastic over insulating cement.
- e. Piping **2-1/2 inch** And Larger:
 - 1) Insulate with segments of molded insulation securely wired in place and coated with skim coat of insulating cement.
 - 2) Apply fitting mastic, fitting tape and finish with final coat of fitting mastic.
- 6. Pipe Hangers:
 - a. Do not allow pipes to come in contact with hangers.
 - b. Pipe Shield:
 - 1) Provide schedule 40 PVC by **6 inch** long at each clevis and/or unistrut type hanger.
 - 2) Provide **16 ga** by **6 inch** long galvanized shields at each pipe hanger to protect pipe insulation from crushing by clevis hanger.
 - 3) Provide **22 ga** by **6 inch** long galvanized shield at each pipe hanger to protect insulation from crushing by Unistrut type hanger.
 - c. At Pipe Hangers:
 - 1) Provide rigid calcium silicate insulation (**100 psi** compressive strength) at least **2 inches** beyond shield.
- 7. Protect insulation wherever leak from valve stem or other source might drip on insulated surface, with aluminum cover or shield rolled up at edges and sufficiently

large in area and of shape that dripping will not splash on surrounding insulation.

- B. Below Grade Piping:
 - 1. Slip underground pipe insulation onto pipe and seal butt joints.
 - 2. Where slip-on technique is not possible, slit insulation, apply to pipe, and seal seams and joints.

3.2 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

- A. Surface Preparation: Clean and dry pipe and fitting surfaces. Remove materials that will adversely affect insulation application.

3.4 GENERAL APPLICATION REQUIREMENTS

- A. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; free of voids throughout the length of piping, including fittings, valves, and specialties.
- B. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each piping system.
- C. Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Apply insulation with longitudinal seams at top and bottom of horizontal pipe runs.
- E. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- F. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder.
- G. Keep insulation materials dry during application and finishing.
- H. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.
- I. Apply insulation with the least number of joints practical.
- J. Apply insulation over fittings, valves, and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated. Refer to special instructions for applying insulation over fittings, valves, and specialties.
- K. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic.

1. Apply insulation continuously through hangers and around anchor attachments. Insulation around hanger or pipe clamp will not be acceptable.
 2. For insulation application where vapor retarders are indicated, extend insulation on anchor legs at least 12 inches (300 mm) from point of attachment to pipe and taper insulation ends. Seal tapered ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.
 3. Install insert materials and apply insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by the insulation material manufacturer.
 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect the jacket from tear or puncture by the hanger, support, and shield.
- L. Insulation Terminations: For insulation application where vapor retarders are indicated, taper insulation ends. Seal tapered ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.
- M. Apply adhesives and mastics at the manufacturer's recommended coverage rate.
- N. Apply insulation with integral jackets as follows:
1. Pull jacket tight and smooth.
 2. Circumferential Joints: Cover with 3-inch- (75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip and spaced 4 inches (100 mm) o.c.
 3. Longitudinal Seams: Overlap jacket seams at least 1-1/2 inches (40 mm). Apply insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches (100 mm) o.c.
 - a. Exception: Do not staple longitudinal laps on insulation having a vapor retarder.
 4. Vapor-Retarder Mastics: Where vapor retarders are indicated, apply mastic on seams and joints and at ends adjacent to flanges, unions, valves, and fittings.
 5. At penetrations in jackets for thermometers and pressure gages, fill and seal voids with vapor-retarder mastic.
- O. Roof Penetrations: Apply insulation for interior applications to a point even with top of roof flashing.
1. Seal penetrations with vapor-retarder mastic.
 2. Apply insulation for exterior applications tightly joined to interior insulation ends.
 3. Extend metal jacket of exterior insulation outside roof flashing at least 2 inches (50 mm) below top of roof flashing.
 4. Seal metal jacket to roof flashing with vapor-retarder mastic.
- P. Exterior Wall Penetrations: For penetrations of below-grade exterior walls, terminate insulation flush with mechanical sleeve seal. Seal terminations with vapor-retarder mastic.
- Q. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and floors.
- R. Fire-Rated Wall and Partition Penetrations: Apply insulation continuously through penetrations of fire-rated walls and partitions.
1. Firestopping and fire-resistive joint sealers are specified in Section "Firestopping."

3.5 MINERAL-FIBER INSULATION APPLICATION

- A. Apply insulation to straight pipes and tubes as follows:
1. Secure each layer of preformed pipe insulation to pipe with wire, tape, or bands without deforming insulation materials.
 2. Where vapor retarders are indicated, seal longitudinal seams and end joints with vapor-retarder mastic. Apply vapor retarder to ends of insulation at intervals of 15 to 20 feet (4.5 to 6 m) to form a vapor retarder between pipe insulation segments.
 3. For insulation with factory-applied jackets, secure laps with outward clinched staples at 6 inches (150 mm) o.c.
 4. For insulation with factory-applied jackets with vapor retarders, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by the insulation material manufacturer and seal with vapor-retarder mastic.

3.6 Apply insulation to flanges as follows:

1. Apply preformed pipe insulation to outer diameter of pipe flange.
 2. Make width of insulation segment the same as overall width of the flange and bolts, plus twice the thickness of the pipe insulation.
 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
 4. Apply canvas jacket material with manufacturer's recommended adhesive, overlapping seams at least 1 inch (25 mm), and seal joints with vapor-retarder mastic.
- B. Apply insulation to fittings and elbows as follows:

1. Apply premolded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
 2. When premolded insulation elbows and fittings are not available, apply mitered sections of pipe insulation, or glass-fiber blanket insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire, tape, or bands.
 3. Cover fittings with standard PVC fitting covers.
- C. Apply insulation to valves and specialties as follows:
1. Apply premolded segments of cellular-glass insulation or glass-fiber blanket insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation. For check valves, arrange insulation for access to strainer basket without disturbing insulation.
 2. Apply insulation to flanges as specified for flange insulation application.
 3. Use preformed standard PVC fitting covers for valve sizes where available. Secure fitting covers with manufacturer's attachments and accessories. Seal seams with tape and vapor-retarder mastic.
 4. For larger sizes where PVC fitting covers are not available, seal insulation with canvas jacket and sealing compound recommended by the insulation material manufacturer.

3.7 CLOSED-CELL PHENOLIC-FOAM INSULATION APPLICATION

- A. Apply insulation to straight pipes and tubes as follows:
1. Secure each layer of insulation to pipe with wire, tape, or bands without deforming insulation materials.
 2. Where vapor retarders are indicated, seal longitudinal seams and end joints with vapor-retarder mastic.
 3. For insulation with factory-applied jackets, secure laps with outward clinched staples at 6 inches o.c.
 4. For insulation with factory-applied jackets with vapor retarders, do not staple longitudinal tabs but secure with additional adhesive as recommended by the insulation material manufacturer and seal with vapor-retarder mastic.
- B. Apply insulation to flanges as follows:
1. Apply preformed pipe insulation to outer diameter of pipe flange.
 2. Make width of insulation segment the same as overall width of the flange and bolts, plus twice the thickness of the pipe insulation.

3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of block insulation of the same thickness as pipe insulation.
 4. Apply canvas jacket material with manufacturer's recommended adhesive, overlapping seams at least 1 inch (25 mm), and seal joints with vapor-retarder mastic.
- C. Apply insulation to fittings and elbows as follows:
1. Apply premolded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
 2. When premolded sections of insulation are not available, apply mitered sections of phenolic-foam insulation. Secure insulation materials with wire, tape, or bands.
 3. Cover fittings with heavy PVC fitting covers. Overlap PVC covers on pipe insulation jackets at least 1 inch (25 mm) at each end. Secure fitting covers with manufacturer's attachments and accessories. Seal seams with tape and vapor-retarder mastic.
- D. Apply insulation to valves and specialties as follows:
1. Apply premolded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
 2. When premolded sections of insulation are not available, apply mitered sections of phenolic-foam insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation. For check valves, arrange insulation for access to strainer basket without disturbing insulation.
 3. Apply insulation to flanges as specified for flange insulation application.
 4. Use preformed heavy PVC fitting covers for valve sizes where available. Secure fitting covers with manufacturer's attachments and accessories. Seal seams with tape and vapor-retarder mastic.
 5. For larger sizes where PVC fitting covers are not available, seal insulation with canvas jacket and sealing compound recommended by the insulation material manufacturer.

3.8 FLEXIBLE ELASTOMERIC THERMAL INSULATION APPLICATION

- A. Apply insulation to straight pipes and tubes as follows:
 - 1. Follow manufacturer's written instructions for applying insulation.
 - 2. Seal longitudinal seams and end joints with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.
- B. Apply insulation to flanges as follows:
 - 1. Apply pipe insulation to outer diameter of pipe flange.
 - 2. Make width of insulation segment the same as overall width of the flange and bolts, plus twice the thickness of the pipe insulation.
 - 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of the same thickness as pipe insulation.
 - 4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.
- C. Apply insulation to fittings and elbows as follows:
 - 1. Apply mitered sections of pipe insulation.
 - 2. Secure insulation materials and seal seams with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.
- D. Apply insulation to valves and specialties as follows:
 - 1. Apply preformed valve covers manufactured of the same material as pipe insulation and attached according to the manufacturer's written instructions.
 - 2. Apply cut segments of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation. For check valves, fabricate removable sections of insulation arranged to allow access to stainer basket.
 - 3. Apply insulation to flanges as specified for flange insulation application.
 - 4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.

3.9 FIELD-APPLIED JACKET APPLICATION

- A. Apply glass-cloth jacket, where indicated, directly over bare insulation or insulation with factory-applied jackets.

- 1. Apply jacket smooth and tight to surface with 2-inch (50-mm) overlap at seams and joints.
- 2. Embed glass cloth between two 0.062-inch- (1.6-mm-) thick coats of jacket manufacturer's recommended adhesive.
- 3. Completely encapsulate insulation with jacket, leaving no exposed raw insulation.
- B. Foil and Paper Jackets: Apply foil and paper jackets where indicated.
 - 1. Draw jacket material smooth and tight.
 - 2. Apply lap or joint strips with the same material as jacket.
 - 3. Secure jacket to insulation with manufacturer's recommended adhesive.
 - 4. Apply jackets with 1-1/2-inch (40-mm) laps at longitudinal seams and 3-inch- (75-mm-) wide joint strips at end joints.
 - 5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-retarder mastic.
- C. Apply metal jacket where indicated, with 2-inch (50-mm) overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches (300 mm) o.c. and at end joints.

3.10 PIPING SYSTEM APPLICATIONS

- A. Insulation materials and thicknesses are specified in schedules at the end of this Section.
- B. Items Not Insulated: Unless otherwise indicated, do not apply insulation to the following systems, materials, and equipment:
 - 1. Flexible connectors.
 - 2. Fire-suppression piping.
 - 3. Drainage piping located in crawl spaces, unless otherwise indicated.
 - 4. Below-grade piping, unless otherwise indicated.
 - 5. Chrome-plated pipes and fittings, unless potential for personnel injury.
 - 6. Air chambers, unions, strainers, check valves, plug valves, and flow regulators.

3.11 INTERIOR INSULATION APPLICATION SCHEDULE

- A. Service: Domestic water piping.
 - 1. Operating Temperature: 60 to 80 deg F
 - 2. Insulation Material: Mineral Fiber
 - 3. Insulation Thickness: 1" thick.
 - 4. Field-Applied Jacket: Foil and Paper(ASJ)
 - 5. Vapor Retarder Required: Yes.
 - 6. Finish: None.
- B. Service: Domestic hot and recirculated hot water.
 - 1. Operating Temperature: 60 to 140 deg F (15 to 60 deg C).
 - 2. Insulation Material: Mineral fiber
 - 3. Insulation Thickness: 1" thick
 - 4. Field-Applied Jacket: Foil and Paper(ASJ)

- 5. Vapor Retarder Required: No
- 6. Finish: None.
- C. Service: Condensate and equipment drain piping.
 - 1. Operating Temperature: 40 to 60 deg F
 - 2. Insulation Material: Flexible elastomeric, only on first ten feet of pipe from trap.
 - 3. Insulation Thickness: 3/4"
 - 4. Field-Applied Jacket: None.
 - 5. Vapor Retarder Required: No.
 - 6. Finish: Two coats of the insulation manufacturer's recommended protective coating.
- D. Service: Refrigerant suction and hot-gas piping.
 - 1. Operating Temperature: 35 to 50 deg F
 - 2. Insulation Material: Flexible elastomeric.
 - 3. Insulation Thickness: 1" thick.
 - 4. Field-Applied Jacket: Aluminum Jacket on building exterior application only.
 - 5. Vapor Retarder Required: Yes.
 - 6. Finish: None.
- E. Service: For obtaining fire/smoke rating in return air plenum (calbes, PE, PB, PP, ABS, PVC, CPVC, etc).
 - 1. Operating Temperature: 35 to 90 deg F
 - 2. Insulation Material: 3M Fire Barrier Plenum Wrap 5 A or equal.

- 3. Insulation Thickness: larger of 1" or mfr's recommendations.
- 4. Field-Applied Jacket: scrim reinforced foil
- 5. Vapor Retarder Required: None.
- 6. Finish: None.

3.12 EXTERIOR INSULATION APPLICATION SCHEDULE

- A. Service: Domestic water.
 - 1. Operating Temperature: 60 to 140 deg F (15 to 60 deg C).
 - 2. Insulation Material: Mineral fiber.
 - 3. Insulation Thickness: Apply the following insulation thicknesses: 1"
 - 4. Field-Applied Jacket: Aluminum.
 - 5. Vapor Retarder Required: Yes.
 - 6. Finish: None.
- B. Service: Refrigerant suction.
 - 1. Operating Temperature: 35 to 50 deg F (2 to 10 deg C).
 - 2. Insulation Material: Flexible elastomeric.
 - 3. Insulation Thickness: Apply the following insulation thicknesses: 1/2"
 - 4. Field-Applied Jacket: Aluminum
 - 5. Vapor Retarder Required: Yes.
 - 6. Finish: None.

END OF SECTION

SECTION 22 11 16
DOMESTIC WATER PIPING

PART 2 - GENERAL

2.1 SUMMARY

- B. Includes But Not Limited To:
 - 3. Perform excavating and backfilling required by work of this Section.
 - 4. Furnish and install potable water piping complete with necessary valves, connections, and accessories inside building and connect with outside utility lines **5 feet** from building perimeter as described in Contract Documents.

2.2 PERFORMANCE REQUIREMENTS

- B. Provide components and installation capable of producing domestic water piping systems with the following minimum working-pressure ratings, unless otherwise indicated:
 - 3. Domestic Water Distribution Piping: 125 psig..

2.3 SUBMITTALS

- B. Action Submittals:
 - 3. Product Data: For pipe, tube, fittings, and couplings.
 - 4. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
- C. Informational Submittals:
 - 3. Test And Evaluation Reports:
 - b. Written report of sterilization test.
- D. Shop Drawings:
 - b. Piping Layout:
 - 3) Provide as-built drawings at end of project.

2.4 QUALITY ASSURANCE

- B. Regulatory Agency Sustainability Approvals:
 - 3. Meet NSF International Standards for materials or products that come into contact with drinking water, drinking water treatment chemicals, or both for chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems.
 - 4. California only: California Assembly Bill 1953 (AB1953) Compliant for Lead Free.
- C. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- D. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic, potable domestic water piping and components.
- E. Comply with NSF 61, "Drinking Water System Components-Health Effects; Sections 1 through 9," for potable domestic water piping and components.

PART 3 - PRODUCTS

3.1 SYSTEMS

- B. Manufacturers:
 - 3. Manufacturer Contact List:
 - b. Aquatherm, Inc.,
 - c. Cash Acme,
 - d. Cla-Val Company,
 - e. Conbraco Industries Inc,
 - f. Hammond Valve,
 - g. Handy & Harmon Products Div,
 - h. Honeywell Inc,
 - i. Leonard Valve Co,
 - j. Milwaukee Valve Co,
 - k. Nibco Inc,
 - l. Rehau,
 - m. Sloan Valve Co,
 - n. Spence Engineering Co,
 - o. Symmons Industries, Braintree,
 - p. Uponor Inc,
 - q. Viega ProPress, Wic
 - r. Watts Regulator Co,
 - s. Wilkins (Zurn Wilkins),
 - t. Zurn PEX, Inc.
- C. Materials:
 - 3. Design Criteria:
 - b. All drinking water products, components, and materials above and below grade used in drinking water systems must meet NSF International Standards for Lead Free.
 - c. **No CPVC allowed.**
 - 4. Pipe:
 - b. Copper:
 - 3) Above-Grade:
 - a) Meet requirements of ASTM B88, Type K & L.
 - b) Hard Copper Tube: ASTM B 88, Types K and L, water tube, drawn tempered.
 - c) Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
 - d) Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
 - e) Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.

- f) Copper, Grooved-End Fittings: ASTM B 75 (ASTM B 75M) copper tube or ASTM B 584 bronze castings.
- g) Copper-Tubing, Keyed Couplings: Copper-tube dimensions and design similar to AWWA C606. Include ferrous housing sections, gasket suitable for hot water, and bolts and nuts.
- 4) Below-Grade:
 - a) Meet requirements of ASTM B88, Type K. **3/4 inch** minimum under slabs.
 - b) **2 inches** And Smaller: Annealed soft drawn.
 - c) **2-1/2 inches** And Larger: Hard Drawn.
- 5) Fittings:
 - a) For Copper Pipe: Wrought copper.
- 5. Connections For Copper Pipe:
 - b. Above-Grade:
 - 3) Sweat copper type with 95/5 or 96/4 Tin-Antimony solder, Bridgit solder, or Silvacrite 100 solder. Use only lead-free solder.
 - 4) Viega ProPress System
 - c. Below Grade:
 - 3) Braze using following type rods:
 - a) Copper to Copper Connections:
 - 2) AWS Classification BCuP-4 Copper Phosphorus (6 percent silver).
 - 3) AWS Classification BCuP-5 Copper Phosphorus (15 percent silver).
 - 4) Copper to Brass or Copper to Steel Connections: AWS Classification BAg-5 Silver (45 percent silver).
 - 5) Do not use rods containing Cadmium.
 - 6) Brazing Flux:
 - a) Approved Products:
 - 1) Stay-Silv white brazing flux by Harris Product Group.
 - 2) High quality silver solder flux by Handy & Harmon.
 - 7) Joints under slabs acceptable only if allowed by local codes.
- 6. Ball Valves:
 - b. Use ball valves exclusively unless otherwise specified. Ball valves shall

- be by single manufacturer from approved list below.
- c. Valves shall be two-piece, full port for **150 psi** SWP.
 - 3) Operate with flow in either direction, suitable for throttling and tight shut-off.
 - 4) Body: Bronze, **150 psig** wsp at **350 deg F** and **400 psig** wog.
 - 5) Seat: Bubble tight at **100 psig** under water.
- d. Class One Quality Standard: Nibco T585 or S585.
 - 3) Equal by Conbraco 'Apollo,' Hammond, Milwaukee, or Watts.
- 7. Combination Pressure Reducing Valve / Strainer:
 - b. Integral stainless steel strainer, or separate 'Y' strainer installed upstream of pressure reducing valve.
 - c. Built-in thermal expansion bypass check valve.
 - d. Class One Quality Standard: Watts LFU5B:
 - 3) Equal by Cash Acme, Cla-Val Hi Capacity, Conbraco 36C, Honeywell-Braukmann, Spence Hi Capacity, Watts, or Wilkins. See Section 01 6200.

PART 4 - EXECUTION

4.1 INSTALLATION

- B. Below Grade:
 - 3. Install piping under slabs without joints where possible.
 - 4. Insulate water piping buried within building perimeter.
 - 5. Bury water piping **6 inches** minimum below bottom of slab and encase in **2 inches** minimum of sand.
- C. Locate cold water lines a minimum of **6 inches** from hot water line.

4.2 FIELD QUALITY CONTROL

- B. Field Tests:
 - 3. Before pipes are covered, test systems in presence of Architect/Engineer at **125 psig** hydrostatic pressure for four (4) hours and show no leaks.
 - 4. Disconnect equipment not suitable for **125 psig** pressure from piping system during test period.

4.3 ADJUSTING

- B. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
 - 3. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide flow of hot water in each branch.
 - 4. Adjust calibrated balancing valves to flows indicated.

4.4 CLEANING

- B. Clean and disinfect potable domestic water piping as follows:**
 - 3. Purge new piping and parts of existing domestic water piping that have been altered, extended, or repaired before using.**
 - 4. Use purging and disinfecting procedures prescribed by authorities having jurisdiction or, if methods are not prescribed, procedures described in either AWWA C651 or AWWA C652 or as described below:**
 - b. Flush piping system with clean, potable water until dirty water does not appear at outlets.**
 - c. Fill and isolate system according to either of the following:**
 - 3) Fill system or part thereof with water/chlorine solution with at least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow to stand for 24 hours.**

- 4) Fill system or part thereof with water/chlorine solution with at least 200 ppm (200 mg/L) of chlorine. Isolate and allow to stand for three hours.**
 - d. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.**
 - e. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.**
- C. Prepare and submit reports of purging and disinfecting activities.**
- D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.**
- E. Water system will not be accepted until negative bacteriological test is made on water taken from system. Repeat dosing as necessary until such negative test is accomplished.**

END OF SECTION

SECTION 22 11 19
DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Balancing valves.
 - 2. Washer-supply outlets.
 - 3. Key-operation hydrants.
 - 4. Trap seal primer valves.
 - 5. Drain valves.
 - 6. Miscellaneous piping specialties.
 - 7. Sleeve penetration systems.
 - 8. Flashing materials.

1.2 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. Meet NSF International Standards for materials or products that come into contact with drinking water, drinking water treatment chemicals, or both for chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems.

PART 2 - PRODUCTS

2.1 BALANCING VALVES

- A. Calibrated Balancing Valves: Adjustable, with two readout ports and memory setting indicator. Include manufacturer's standard hoses, fittings, valves, differential pressure meter, and carrying case.
- B. Manufacturers:
 - 1. Armstrong Pumps, Inc.
 - 2. Flow Design, Inc.
 - 3. ITT Industries; Bell & Gossett Div.
 - 4. Taco, Inc.
 - 5. Watts Industries, Inc.; Water Products Div.
 - 6. 2" and Smaller: Bronze body with brass ball, adjustment knob, calibrated nameplate, and threaded or solder-joint ends.
 - 7. 2" and Smaller: Bronze, Y-pattern body with adjustment knob and threaded ends.
 - 8. 2.5" and Larger: Cast-iron, Y-pattern body with bronze disc and flanged or grooved ends.
- C. B. Memory-Stop Balancing Valves, NPS 2 (DN 50) and smaller: MSS SP-110, ball valve, rated for 400-psig (2760-kPa) minimum CWP. Include two-piece, copper-alloy body with full-port, chrome-plated brass ball, replaceable seats and seals, threaded or solder-joint ends, and vinyl-covered steel handle with memory-stop device.
- D. Manufacturers:
 - 1. Conbraco Industries, Inc.

- 2. Crane Co., Crane Valve Group; Crane Valves.
- 3. Grinnell Corporation.
- 4. NIBCO INC.
- 5. Red-White Valve Corp.

2.2 STRAINERS

- A. Strainers: Y-pattern, unless otherwise indicated, and full size of connecting piping. Include ASTM A 666, Type 304, stainless-steel screens with 3/64-inch (1.2-mm) round perforations, unless otherwise indicated.
 - 1. Pressure Rating: 125-psig (860-kPa) minimum steam working pressure, unless otherwise indicated.
 - 2. NPS 2 (DN 50) and Smaller: Bronze body, with female threaded ends.
 - 3. NPS 2-1/2 (DN 65) and Larger: Cast-iron body, with interior AWWA C550 or FDA-approved, epoxy coating and flanged ends.

2.3 OUTLET BOXES

- A. Manufacturers:
 - 1. Acorn Engineering Company.
 - 2. Gray, Guy Manufacturing Co., Inc.
 - 3. Symmons Industries, Inc.
- B. General: Recessed-mounting outlet boxes with supply fittings complying with ASME A112.18.1M. Include box with faceplate, services indicated for equipment connections, and wood-blocking reinforcement.
- C. Clothes Washer Outlet Boxes: With hot- and cold-water hose connections, drain, and the following:
 - 1. Box and Faceplate: [Stainless steel] [Enameled or epoxy-painted steel].
 - 2. Shutoff Fitting: Two hose bibbs.
 - 3. Supply Fittings: Two NPS 1/2 (DN 15) gate, globe, or ball valves and NPS 1/2 (DN 15) copper, water tubing.
 - 4. Drain: NPS 2 (DN 50) standpipe, P-trap, and direct waste connection to drainage piping.
 - 5. Inlet Hoses: Two ASTM D 3571, 60-inch- (1500-mm-) long, rubber household clothes washer inlet hoses with female hose-thread couplings.
 - 6. Drain Hose: One 48-inch- (1200-mm-) long, rubber household clothes washer drain hose with hooked end.
- D. Icemaker Outlet Boxes: With hose connection and the following:
 - 1. Box and Faceplate: Stainless steel.
 - 2. Shutoff Fitting: Hose bibb.

3. Supply Fitting: NPS 1/2 (DN 15) gate, globe, or ball valve and NPS 1/2 (DN 15) copper, water tubing.

2.4 KEY-OPERATION HYDRANTS

- A. Manufacturers:
 1. Josam Co.
 2. Smith, Jay R. Mfg. Co.
 3. Woodford Manufacturing Co.
- B. General: ASME A112.21.3M, key-operation hydrant with pressure rating of 125 psig.
 1. Inlet: 3/4 " or NPS 1" threaded or solder joint.
 2. Outlet: ASME B1.20.7, garden-hose threads.
 3. Operating Keys: One with each key-operation hydrant.
- C. Moderate-Climate, Concealed-Outlet Wall Hydrants: ASSE 1019, self-drainable with flush-mounting box with cover, integral nonremovable hose-connection vacuum breaker, and concealed outlet.
 1. Classification: Type A, for automatic draining with hose removed or Type B, for automatic draining with hose removed or with hose attached and nozzle closed.
- D. Hot and Cold, Nonfreeze Concealed-Outlet Wall Hydrants: With deep flush-mounting box with cover; hot- and cold-water casings and operating rods to match wall thickness; concealed outlet; wall clamps; and factory- or field-installed, nonremovable and manual drain-type, hose-connection vacuum breaker complying with ASSE 1011.

2.5 ROOF HYDRANTS

- A. Design Criteria:
 1. Provide dual check backflow preventer.
 2. Non-freeze.
 3. Drain port - connect to drain

2.6 TRAP SEAL PRIMER VALVES

- A. Supply-Type Trap Seal Primer Valves: ASSE 1018, water-supply-fed type, with the following characteristics:
- B. Manufacturers:
 1. Josam Co.
 2. MIFAB Manufacturing, Inc.
 3. Precision Plumbing Products, Inc.
 4. Smith, Jay R. Mfg. Co.
 5. 125-psig (860-kPa) minimum working pressure.
 6. Bronze body with atmospheric-vented drain chamber.
 7. Inlet and Outlet Connections: NPS 1/2 (DN 15) threaded, union, or solder joint.
 8. Gravity Drain Outlet Connection: NPS 1/2 (DN 15) threaded or solder joint.
 9. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

2.7 MISCELLANEOUS PIPING SPECIALTIES

- A. Water Hammer Arresters: ASSE 1010 or PDI-WH 201, metal-bellows type with pressurized metal cushioning chamber. Sizes indicated are based on ASSE 1010 or PDI-WH 201, Sizes A through F.
- B. Manufacturers:
 1. Josam Co.
 2. Smith, Jay R. Mfg. Co.
 3. Tyler Pipe; Wade Div.
 4. Zurn Industries, Inc.; Specification Drainage Operation.
- C. Hose Bibbs: Bronze body with replaceable seat disc complying with ASME A112.18.1M for compression-type faucets. Include NPS 1/2 or NPS 3/4 (DN 15 or DN 20) threaded or solder-joint inlet, of design suitable for pressure of at least 125 psig (860 kPa); integral [or field-installed,] nonremovable, drainable hose-connection vacuum breaker; and garden-hose threads complying with ASME B1.20.7 on outlet.
- D. Roof Flashing Assemblies: Manufactured assembly made of [4-lb/sq. ft. (20-kg/sq. m), 0.0625-inch- (1.6-mm-)] [6-lb/sq. ft. (30-kg/sq. m), 0.0938-inch- (2.4-mm-)] thick, lead flashing collar and skirt extending at least [6 inches (150 mm)] [8 inches (200 mm)] [10 inches (250 mm)] from pipe with galvanized steel boot reinforcement, and counterflashing fitting.
- E. Floor-Drain Inlet Fittings: Cast iron, with threaded inlet and threaded or spigot outlet, and trap seal primer valve connection.
- F. Fixed Air-Gap Fittings: Manufactured cast-iron or bronze drainage fitting with semiopen top with threads or device to secure drainage inlet piping in top and bottom spigot or threaded outlet larger than top inlet. Include design complying with ASME A112.1.2 that will provide fixed air gap between installed inlet and outlet piping.
- G. Stack Flashing Fittings: Counterflashing-type, cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.
- H. Vent Caps: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and set-screws to secure to vent pipe.
- I. Vent Terminals: Commercially manufactured, shop- or field-fabricated, frost-proof assembly constructed of galvanized steel, copper, or lead-coated copper. Size to provide 1-inch (25-mm) enclosed air space between outside of pipe and inside of flashing collar extension, with counterflashing.
- J. Expansion Joints: ASME A112.21.2M, assembly with cast-iron body with bronze sleeve, packing gland, and packing; of size and end types corresponding to connected piping.

2.8 SLEEVE PENETRATION SYSTEMS

- A. Manufacturers:
 - 1. ProSet Systems, Inc.
- B. Description: UL 1479, through-penetration firestop assembly consisting of sleeve and stack fitting with firestopping plug.
 - 1. Sleeve: Molded PVC plastic, of length to match slab thickness and with integral nailing flange on one end for installation in cast-in-place concrete slabs.
 - 2. Stack Fitting: ASTM A 48 (ASTM A 48M), gray-iron, hubless-pattern, wye-branch stack fitting with neoprene O-ring at base and gray-iron plug in thermal-release harness in branch. Include PVC protective cap for plug.
 - 3. Special Coating: Include corrosion-resistant interior coating on fittings for plastic chemical waste and vent stacks.

2.9 FLASHING MATERIALS

- A. Lead Sheet: ASTM B 749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:
 - 1. General Use: 4-lb/sq. ft. (20-kg/sq. m), 0.0625-inch (1.6-mm) thickness.
 - 2. Vent Pipe Flashing: 3-lb/sq. ft. (15-kg/sq. m), 0.0469-inch (1.2-mm) thickness.
 - 3. Burning: 6-lb/sq. ft. (30-kg/sq. m), 0.0938-inch (2.4-mm) thickness.
- B. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil (1.01-mm) minimum thickness.
- C. Fasteners: Metal compatible with material and substrate being fastened.
- D. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.
- E. Solder: ASTM B 32, lead-free alloy.
- F. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.
 - 1. Not required to meet NSF International Standards for Lead Free.
 - 2. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Jay R. Smith: 5907.
 - 2) Prier: P-RH2.
 - 3) Woodford: RHY2-MS.
 - 3. Water Hammer Arrestors:
 - 1. Design Criteria:
 - 1) Meet NSF International Standards for Lead Free.
 - 2) Nesting type, air pre-charged bellows with casing.
 - 3) Bellows constructed of stabilized 18-8 stainless steel.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Install pressure regulators with inlet and outlet shutoff valves and balance valve bypass. Install pressure gages on inlet and outlet.
- B. Install strainers on supply side of each control valve, pressure regulator, and solenoid valve.
- C. Install trap seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.
- D. Install backwater valves in building drain piping. For interior installation, provide cleanout deck plate flush with floor and centered over backwater valve cover, and of adequate size to remove valve cover for servicing.
- E. Install expansion joints on vertical risers, stacks, and conductors if indicated.

3.2 CONNECTIONS

- A. Install piping adjacent to equipment to allow service and maintenance.
- B. Ground equipment.
- C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- D. Connect plumbing specialties and devices that require power.

3.3 FLASHING INSTALLATION

- A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:
 - 1. Lead Sheets: Burn joints of lead sheets 6-lb/sq. ft. (30-kg/sq. m), 0.0938-inch (2.4-mm) thickness or thicker. Solder joints of lead sheets 4-lb/sq. ft. (20-kg/sq. m), 0.0625-inch (1.6-mm) thickness or thinner.
- B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
 - 1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches (250 mm), and skirt or flange extending at least 8 inches (200 mm) around pipe.
 - 2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around sleeve.
 - 3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around specialty.
- C. Set flashing on floors and roofs in solid coating of bituminous cement.
- D. Secure flashing into sleeve and specialty clamping ring or device.
- E. Install flashing for piping passing through roofs with counterflashing or commercially made

flashing fittings, according to "Sheet Metal Flashing and Trim."

- F. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled trap seal primer systems and their installation, including piping and electrical connections. Report results in writing.

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new units, and retest.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

END OF SECTION

SECTION 22 13 13
FACILITY SANITARY SEWERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Furnish and install soil, waste, and vent piping systems within building and connect with outside utility lines **5 feet** out from building where applicable.
 - 2. Perform excavation and backfill required by work of this Section.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Cover Observation.
 - 1. Contact Architect/Engineer prior to covering any section of pipe.
 - 2. All piping all be under pressure during observation

1.3 REFERENCES

- A. Reference Standards:
 - 1. International Code Council:
 - a. ICC IPC-2012, 'International Plumbing Code'.

1.4 PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing piping systems with the following minimum working-pressure ratings, unless otherwise indicated:
 - 1. Soil, Waste, and Vent Piping: 10-foot head of water (30 kPa).

1.5 SUBMITTALS

- A. Product Data: For pipe, tube, fittings, and couplings.
- B. Shop Drawings: For solvent drainage system, include plans, elevations, sections, and details.
- C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.6 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 PVC PIPING

- A. PVC Pipe: ASTM D 2665, solid-wall drain, waste, and vent.
 - 1. PVC Socket Fittings: ASTM D 2665, socket type, made to ASTM D 3311, drain, waste, and vent patterns.
- B. PVC Special Fittings: ASTM F 409, drainage-pattern tube and tubular fittings with ends as required for application.

- C. Plenum Vent Lines: In areas of building with a return air plenum.

1. Approved Types:

- a. Service weight, single-hub or no-hub type cast iron soil pipe meeting requirements of ASTM A74.
- b. Vent lines **2-1/2 inches** or smaller may be Schedule 40 galvanized steel.
- c. Joint Material:
 - 1) Single-Hub: Rubber gaskets meeting requirements of ASTM C564.
 - 2) No-Hub Pipe: Neoprene gaskets with stainless steel cinch bands.
- d. Fittings:
- e. Cast Iron Pipe: Hub and spigot, except fittings for no-hub pipe shall be no-hub, and meet requirements of ASTM A74.
 - 1) Joint Material: Rubber gaskets meeting requirements of ASTM C564.
 - 2) Galvanized Pipe: Screwed Durham tarred drainage type.

2.2 EXECUTION

2.3 PIPING INSTALLATION

- A. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.
- B. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight.
- C. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep ¼ bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixture are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- D. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written

instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

- E. Re-verify building drainage piping slope before covering pipe in trench if left uncovered over a 24 hour period of subjected to exterior water. If slope of piping has changed, provide new shoring material to maintain original slope after trench has been covered.
- F. Install soil and waste drainage and vent piping at the code required minimum slopes, unless otherwise indicated:
- G. Install engineered soil and waste drainage and vent piping systems in locations indicated and as follows:
 - 1. Combination Waste and Vent: Comply with standards of authorities having jurisdiction.
 - 2. Cast-Iron, Sovent, Single Stack: Comply with ASSE 1043 and sovent fitting manufacturer's written installation instructions.
 - 3. Reduced-Size Venting: Comply with standards of authorities having jurisdiction.
- H. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.
- I. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.
- J. Install underground PVC soil and waste drainage piping according to ASTM D 2321.
- K. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

2.4 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect drainage and vent piping to the following:
 - 1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code. Refer to Section "Plumbing Fixtures."
 - 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
 - 3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
 - 4. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection.

Use flanges instead of unions for connections **NPS 2-1/2 (DN 65)** and larger

2.5 FIELD QUALITY CONTROL

- A. Field Tests:
 - 1. Conduct tests for leaks and defective work. Notify Architect before testing.
 - 2. Thermoplastic Pipe System:
 - a. Before backfilling and compacting of trenches, Fill waste and vent system with water to roof level or **10 feet** minimum, and show no leaks for two hours. Correct leaks and defective work.
 - b. After backfilling and compacting of trenches is complete but before placing floor slab, re-test as specified above. Uncover pipe and correct leaks and defective work. Re-backfill and compact and re-test.
- B. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 - 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- C. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- D. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- E. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 - 2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - 3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water (30 kPa). From

- 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg (250 Pa). Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.

5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

2.6 CLEANING

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION

SECTION 22 13 19
FACILITY SANITARY SEWER SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Products Furnished But Not Installed Under this Section as described in Contract Documents.
 - 1. Cleanouts.
 - 2. Floor drains.

1.2 PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing piping systems with following minimum working-pressure ratings, unless otherwise indicated:
 - 1. Sanitary Waste and Vent Piping: 10-foot head of water.
 - 2. Storm Drainage Piping: 10-foot head of water.

1.3 SUBMITTALS

- A. Product Data: Include rated capacities and shipping, installed, and operating weights. Indicate materials, finishes, dimensions, required clearances, and methods of assembly of components; and piping and wiring connections for the following:
 - 1. Cleanouts, floor drains, and roof drains.
 - 2. Roof flashing assemblies.
 - 3. Grease interceptors(if applicable)
 - 4. Sleeve penetration systems.

PART 2 - PRODUCTS

2.1 SLEEVE PENETRATION SYSTEMS

- A. Manufacturers:
 - 1. ProSet Systems, Inc.
- B. Description: UL 1479, through-penetration firestop assembly consisting of sleeve and stack fitting with firestopping plug.
 - 1. Sleeve: Molded PVC plastic, of length to match slab thickness and with integral nailing flange on one end for installation in cast-in-place concrete slabs.
 - 2. Stack Fitting: ASTM A 48 (ASTM A 48M), gray-iron, hubless-pattern, wye-branch stack fitting with neoprene O-ring at base and gray-iron plug in thermal-release harness in branch. Include PVC protective cap for plug.
 - a. Special Coating: Include corrosion-resistant interior coating on fittings for plastic chemical waste and vent stacks.

2.2 FLASHING MATERIALS

- A. Lead Sheet: ASTM B 749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:
 - 1. General Use: 4-lb/sq. ft. (20-kg/sq. m), 0.0625-inch (1.6-mm) thickness.

- 2. Vent Pipe Flashing: 3-lb/sq. ft. (15-kg/sq. m), 0.0469-inch (1.2-mm) thickness.
- 3. Burning: 6-lb/sq. ft. (30-kg/sq. m), 0.0938-inch (2.4-mm) thickness.
- B. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil (1.01-mm) minimum thickness.
- C. Fasteners: Metal compatible with material and substrate being fastened.
- D. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.
- E. Solder: ASTM B 32, lead-free alloy.
- F. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

2.3 CLEANOUTS

- A. Cleanouts: Comply with [ASME A112.36.2M] [ASME A112.3.1] <Insert other>.
 - 1. Application: [Floor cleanout] [Wall cleanout] [For installation in exposed piping].
 - 2. Products:
 - a. Josam Co.
 - b. Mifab
 - c. Smith, Jay R. Mfg. Co.
 - d. Tyler Pipe, Wade Div.
 - e. Zurn Industries, Inc., Specification Drainage Operation.

2.4 FLOOR DRAINS

- A. Floor Drains.
 - 1. Products:
 - a. Josam Co.
 - b. Mifab
 - c. Smith, Jay R. Mfg. Co.
 - d. Tyler Pipe, Wade Div.
 - e. Zurn Industries, Inc.
 - f.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install trap seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.
- B. Install backwater valves in building drain piping. For interior installation, provide cleanout deck plate flush with floor and centered over backwater valve cover, and of adequate size to remove valve cover for servicing.
- C. Install expansion joints on vertical risers, stacks, and conductors if indicated.

- D. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
 - 1. Size same as drainage piping up to NPS 4 (DN 100). Use NPS 4 (DN 100) for larger drainage piping unless larger cleanout is indicated.
 - 2. Locate at each change in direction of piping greater than 45 degrees.
 - 3. Locate at minimum intervals of 50 feet (15 m) for piping NPS 4 (DN 100) and smaller and 100 feet (30 m) for larger piping.
 - 4. Locate at base of each vertical soil and waste stack.
- E. Install cleanout deck plates with top flush with finished floor, for floor cleanouts for piping below floors.
- F. Install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall, for cleanouts located in concealed piping.
- G. Install flashing flange and clamping device with each stack and cleanout passing through floors with waterproof membrane.
- H. Install vent flashing sleeves on stacks passing through roof. Secure over stack flashing according to manufacturer's written instructions.
- I. Install frost-proof vent caps on each vent pipe passing through roof. Maintain 1-inch (25-mm) clearance between vent pipe and roof substrate.
- J. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
 - 1. Position floor drains for easy access and maintenance.
 - 2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
 - a. Radius, 30 Inches (750 mm) or Less: Equivalent to 1 percent slope, but not less than 1/4-inch (6.35-mm) total depression.
 - b. Radius, 30 to 60 Inches (750 to 1500 mm): Equivalent to 1 percent slope.
 - c. Radius, 60 Inches (1500 mm) or Larger: Equivalent to 1 percent slope, but not greater than 1-inch (25-mm) total depression.
 - 3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
 - 4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

- K. Install roof drains at low points of roof areas according to roof membrane manufacturer's written installation instructions.
 - 1. Install roof-drain flashing collar or flange so no leakage occurs between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.
 - 2. Position roof drains for easy access and maintenance.
- L. Install interceptors, including trapping, venting, and flow-control fitting, according to authorities having jurisdiction and with clear space for servicing.
 - 1. Flush with In-Ground Installation: Set unit and extension, if required, with cover flush with finished grade.
 - 2. Install cleanout immediately downstream from interceptors not having integral cleanout on outlet.
- M. Fasten wall-hanging plumbing specialties securely to supports attached to building substrate if supports are specified and to building wall construction if no support is indicated.
- N. Fasten recessed-type plumbing specialties to reinforcement built into walls.
- O. Install wood-blocking reinforcement for wall-mounting and recessed-type plumbing specialties.
- P. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

3.2 CONNECTIONS

- A. Install piping adjacent to equipment to allow service and maintenance.
- B. Ground equipment.
- C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- D. Connect plumbing specialties and devices that require power according to Division Sections.
- E. Interceptor Connections: Connect piping, flow-control fittings, and accessories.
 - 1. Grease Interceptors: Connect inlet and outlet to unit, and flow-control fitting and vent to unit inlet piping.

3.3 FLASHING INSTALLATION

- A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:
 - 1. Lead Sheets: Burn joints of lead sheets 6-lb/sq. ft. (30-kg/sq. m), 0.0938-inch (2.4-mm) thickness or thicker. Solder joints of

- lead sheets 4-lb/sq. ft. (20-kg/sq. m),
0.0625-inch (1.6-mm) thickness or thinner.
- B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
 - 1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches (250 mm), and skirt or flange extending at least 8 inches (200 mm) around pipe.
 - 2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around sleeve.
 - 3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around specialty.
 - C. Set flashing on floors and roofs in solid coating of bituminous cement.
 - D. Secure flashing into sleeve and specialty clamping ring or device.
 - E. Install flashing for piping passing through roofs with counterflashing or commercially made flashing fittings.
 - F. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled trap seal primer systems and their installation, including piping and electrical connections. Report results in writing.
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new units, and retest.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.5 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION

SECTION 22 47 13
ELECTRIC DRINKING FOUNTAINS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Drinking fountains.
 - 2. Self-contained water coolers.
 - 3. Fixture supports.

1.3 DEFINITIONS

- A. Accessible Drinking Fountain and Water Cooler: Fixture that can be approached and used by people with disabilities.
- B. Drinking Fountain: Fixture with nozzle for delivering stream of water for drinking.
- C. Fitting: Device that controls flow of water into or out of fixture.
- D. Fixture: Drinking fountain or water cooler, unless one is specifically indicated.
- E. Water Cooler: Electrically powered fixture for generating and delivering cooled drinking water.

1.4 SUBMITTALS

- A. Product Data: Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories for each type of fixture indicated.
- B. Shop Drawings: Diagram power, signal, and control wiring and differentiate between manufacturer-installed and field-installed wiring.
- C. Maintenance Data: For fixtures to include in maintenance manuals specified in Division.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities" about fixtures for people with disabilities.
- C. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.
- D. ARI Standard: Comply with ARI 1010, "Self-Contained, Mechanically Refrigerated Drinking-Water Coolers," for water coolers and with ARI's "Directory of Certified Drinking Water Coolers" for type and style classifications.
- E. TAS: Texas Accessibility Standards.

1.6 COORDINATION

- A. Coordinate roughing-in and final fixture locations, and verify that fixtures can be installed to comply with original design and referenced standards.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified below.
 - 1. Elkay.
 - 2. Halsey Taylor.
 - 3. Haws Corporation.

2.2 DRINKING FOUNTAINS

- A. Drinking Fountains,: Accessible, Style W, wall-hanging fixture made of stainless steel.
 - 1. Receptor Shape: Rectangular.
 - 2. Back Panel: Stainless-steel wall plate behind drinking fountain.
 - 3. Bubblers: Two, with automatic stream regulator, located on deck.
 - 4. Control: Push button.
 - 5. Supply: NPS 3/8 (DN 10) with ball, gate, or globe valve.
 - 6. Drain: Grid with NPS 1-1/4 (DN 32) minimum horizontal waste and trap complying with ASME Standards.
 - 7. Support: Type I, water-cooler carrier. Refer to "Fixture Supports" Article.

2.3 SELF-CONTAINED WATER COOLERS

- A. Water Coolers: Accessible, ARI 1010, Type PB, pressure with bubbler, Style W, wall-hanging fixture.
 - 1. Cabinet: Bilevel with two attached cabinets, enameled steel with stainless-steel top.
 - 2. Bubbler: One, with automatic stream regulator, located on each cabinet deck.
 - 3. Control: Push button.
 - 4. Supply: NPS 3/8 (DN 10) with ball, gate, or globe valve and filter.
 - 5. Drain: Grid with NPS 1-1/4 (DN 32) minimum horizontal waste and trap complying with ASME Standards.
 - 6. Cooling System: Electric, with hermetically sealed compressor, cooling coil, air-cooled condensing unit, corrosion-resistant tubing, refrigerant, corrosion-resistant-metal storage tank, and adjustable thermostat.
 - a. Capacity: 8 gph (0.0084 L/s) of 50 deg F (10 deg C) cooled water from 80 deg F (27 deg C) inlet water and 90 deg F (32 deg C) ambient air temperature.
 - b. Electrical Characteristics: 1/5 hp; 120-V ac; single phase; 60 Hz.
 - 7. Support: Type II, water-cooler carrier. Refer to "Fixture Supports" Article.

2.4 FIXTURE SUPPORTS

- A. Off-Floor, Plumbing Fixture Supports: ASME A112.6.1M, water-cooler carriers. Include vertical, steel uprights with feet and tie rods and bearing plates with mounting studs matching fixture to be supported.
 - 1. Available Manufacturers:
 - 2. Manufacturers:
 - a. Josam Co.
 - b. Smith, Jay R. Mfg. Co.
 - c. Tyler Pipe; Wade Div.
 - d. Zurn Specifications Drainage Operation.
 - 3. Type I: Hanger-type carrier with two vertical uprights.
 - 4. Type II: Bilevel, hanger-type carrier with three vertical uprights.
 - 5. Supports for Accessible Fixtures: Include rectangular, vertical, steel uprights instead of steel pipe uprights.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine roughing-in for water and waste piping systems to verify actual locations of piping connections before fixture installation. Verify that sizes and locations of piping and types of supports match those indicated.
- B. Examine walls and floors for suitable conditions where fixtures are to be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

- A. Use carrier off-floor supports for wall-hanging fixtures, unless otherwise indicated.
- B. Use chrome-plated brass or copper tube, fittings, and valves in locations exposed to view. Plain copper tube, fittings, and valves may be used in concealed locations.

3.3 INSTALLATION

- A. Install off-floor supports affixed to building substrate and attach wall-hanging fixtures, unless otherwise indicated.

- B. Install mounting frames affixed to building construction and attach recessed water coolers to mounting frames, unless otherwise indicated.
- C. Install fixtures level and plumb.
- D. Install water-supply piping with shutoff valve on supply to each fixture to be connected to water distribution piping. Use ball, gate, or globe valve. Install valves in locations where they can be easily reached for operation. Refer to Division Section "Valves" for general-duty valves.
- E. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.
- F. Install pipe escutcheons at wall penetrations in exposed, finished locations. Use deep-pattern escutcheons where required to conceal protruding pipe fittings. Refer to Division Section "Basic Mechanical Materials and Methods" for escutcheons.
- G. Seal joints between fixtures and walls and floors using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Refer to Division for sealant and installation requirements.

3.4 CONNECTIONS

- A. Piping installation requirements are specified in other Division Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect water supplies from water distribution piping to fixtures.
- C. Connect drain piping from fixtures to drainage piping.
- D. Ground equipment.
 - 1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

END OF SECTION

DIVISION 23

HVAC

THE AGREEMENT, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, SUPPLEMENTARY CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, AND ALL ADDENDA ARE A PART OF THE CONTRACT. THE CONTRACTOR SHALL CONSULT THEM IN DETAIL FOR INSTRUCTIONS PERTAINING TO THE WORK. THE CONTRACTOR SHALL ALSO CONSULT ALL OTHER DIVISIONS AND SECTIONS OF THE PROJECT MANUAL, AND ALL DRAWINGS IN THE EXECUTION OF THE WORK OF THE CONTRACT.

THE CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, SYSTEMS, EQUIPMENT, ITEMS, ARTICLES, OPERATIONS, AND/OR METHODS LISTED, IMPLIED, MENTIONED, OR SCHEDULED IN THE CONTRACT DOCUMENTS AND/OR NECESSARY AND/OR REQUIRED FOR THE SATISFACTORY COMPLETION OF THE WORK.

THE LISTING OF WORK, REQUIREMENTS, AND PRODUCTS IN THIS SECTION IS NOT INTENDED TO BE CONCLUSIVE. THE CONTRACTOR SHALL CHECK ALL OTHER PARTS OF THE CONTRACT DOCUMENTS AND SHALL PROVIDE ALL MISCELLANEOUS ITEMS OF WORK AND PRODUCTS NECESSARY FOR THE SATISFACTORY COMPLETION OF THE WORK DESCRIBED IN THE CONTRACT DOCUMENTS

**SECTION 23 01 00
SUMMARY OF MECHANICAL WORK**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. The following Summary of Work is intended as an aid to achieve an understanding of the various elements of work included in the project, as is not intended to be all-inclusive. Detailed descriptions of work and requirements are given in drawings and specifications.
- B. Mechanical Contract Documents were prepared for the Project by:

Trinity MEP Engineering, LLC
3533 Moreland Dr. Ste. A
Weslaco, Texas 78596
Phone Number: (956) 973-0500
Contact Person: Leonardo Munoz, P.E.

- C. General Scope of Work:

1. Install AC equipment and ductwork as shown on the contract documents. Refer to drawings for schedule of equipment that will be installed. After installing equipment, connect power to unit.
2. HVAC: Provide all materials and labor associated with a complete operational installation of new HVAC systems including, but not limited to:

- DX Split System A/C Units
- Exhaust fans
- Sheet metal, Ductwork
- Diffusers and Grilles
- Duct accessories, including grilles, and louvers
- Air Test and Balance

1.3 COORDINATION

- A. All mechanical work shall be done under sub-contract to a General Contractor. Mechanical Contractor shall coordinate all work through General Contractor, even in areas where only mechanical work is to take place.
- B. Coordination between all trades shall take place on a regular basis to avoid conflicts between disciplines and equipment clearances.
- C. Work shall take place with minimal disruption to Owner's operations in areas surrounding the new building.
- D. Cooperate fully with other contractors so that work under those contracts may be carried

out smoothly, without interfering with or delaying work under this Contract.

- E. Fully coordinate with electrical contractor for providing power to mechanical equipment.
- F. Mechanical Contractor is responsible for all control wiring including thermostat(s). This includes all conduit, wire, and accessories both low voltage and source voltage for the controls' system. Mechanical Contractor will provide all the necessary actuators, relays, software, hardware, and all necessary accessories required for a fully functional controls' system.

1.4 UTILITIES

1. Coordinate with power, water, telephone, cable and gas utilities to locate all utilities prior to digging in any area.
2. Obtain any approvals required from utilities to relocate utilities.
3. Cost of relocating or bypassing utilities indicated on drawings shall be included in Base Bid.

1.5 CONTRACTOR USE OF PREMISES

- A. Use of the Site: Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.
1. Owner Occupancy: Allow for Owner occupancy and use by the public.
 2. Driveways and Entrances: Keep driveways and entrances serving the premises, clear and available to the Owner, the Owner's employees, and emergency vehicles at all time. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- B. Site Safety: Take every precaution to ensure the site does not present a threat to the safety of occupants and/or workers. Minimal safety requirements include, but are not limited to the following:
1. Temporary fencing around construction areas.
 2. Yellow caution tape and construction barricades along open trenches during the day. Trenches shall be covered at night and warning lights provided on construction barricades.
 3. Temporary fencing around equipment while site work is in progress.

1.6 SUBMITTALS

1. To expedite the submittal process more efficiently, DO NOT piece-meal the submittals. Submit entire mechanical or

plumbing in a bound enclosure. This will | eliminate delays in the submittal process.

END OF SECTION

SECTION 23 05 10
BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.2 SUMMARY

- A. This Section includes the following basic mechanical materials and methods to complement other Sections.
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. Concrete base construction requirements.
 - 3. Escutcheons.
 - 4. Dielectric fittings.
 - 5. Flexible connectors.
 - 6. Mechanical sleeve seals.
 - 7. Equipment nameplate data requirements.
 - 8. Nonshrink grout for equipment installations.
 - 9. Field-fabricated metal and wood equipment supports.
 - 10. Installation requirements common to equipment specification sections.
 - 11. Cutting and patching.
 - 12. Touchup painting and finishing.

1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F. The following are industry abbreviations for plastic materials:
- G. PVC: Polyvinyl chloride plastic.
- H. The following are industry abbreviations for rubber materials:

- 1. EPDM: Ethylene propylene diene terpolymer rubber.

1.4 SUBMITTALS

- A. Product Data: For dielectric fittings, flexible connectors, mechanical sleeve seals, and identification materials and devices.
- B. Coordination Drawings: Detail major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Show space requirements for installation and access. Indicate if sequence and coordination of installations are important to efficient flow of the Work. Include the following:
 - 1. Planned piping layout, including valve and specialty locations and valve-stem movement.
 - 2. Clearances for servicing and maintaining equipment, accessories, and specialties, including space for disassembly required for periodic maintenance.
 - 3. Sizes and location of required concrete pads and bases.
 - 4. Floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
 - 5. Reflected ceiling plans to coordinate and integrate installation of air outlets and inlets, light fixtures, communication system components, sprinklers, and other ceiling-mounted items.

1.5 QUALITY ASSURANCE

- A. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.
- B. Equipment Selection: Equipment of higher electrical characteristics, physical dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. Additional costs shall be approved in advance by appropriate Contract Modification for these increases. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design and commissioning requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and prevent entrance of dirt, debris, and moisture.

- B. Protect stored pipes, ductwork, equipment, and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.
- C. Protect flanges, fittings, and piping specialties from moisture and dirt.
- D. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 SEQUENCING AND SCHEDULING

- A. Coordinate mechanical equipment installation with other building components.
- B. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.
- C. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.
- D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning before closing in building.
- E. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.
- F. Coordinate requirements for access panels and doors if mechanical items requiring access are concealed behind finished surfaces. Access panels and doors are specified in architectural section.
- G. Coordinate installation of identifying devices after completing covering and painting, if devices are applied to surfaces. Install identifying devices before installing acoustical ceilings and similar concealment.

1.8 OPERATION PRIOR TO ACCEPTANCE

- A. When any equipment is operable, and it is to the advantage of the Contractor to operate the equipment, he may do so provided that he properly supervises the operation, and retains full responsibility for the equipment operated.
- B. Regardless of whether or not the equipment has or has not been operated, the Contractor shall clean the equipment properly, make required adjustments, and complete punch list items before final acceptance by the Owner.
- C. The date of acceptance by the Engineer, for beneficial use by the Owner, shall be the beginning date of the warranty period.

1.9 SPACE AND EQUIPMENT ARRANGEMENT

- A. The size of each item of mechanical equipment shown on the Drawings is based on the dimensions of a particular manufacturer as indicated. While other manufacturers may be acceptable, it shall be the responsibility of the Contractor to determine whether or not the equipment he proposes to furnish will fit into the space. Shop drawings shall be prepared when required by the engineer to indicate a suitable arrangement.
- B. Install equipment in a manner to permit access to all surfaces. Install valves, motors, drives, lubricating devices, filters, and other accessory items in a position to allow removal for service without requiring the disassembly of another part.
- C. Provide access panels acceptable to the Engineer for equipment that is concealed above ceiling space.
- D. Large equipment assemblies or components which will be installed in the building, and which are too large to permit access through doorways, stairways or shafts, shall be brought to the site and placed in the appropriate spaces before the enclosing structure is completed. Provisions shall be implemented by the Contractor to insure that the equipment will not be damaged in any way during the associated construction procedures.

1.10 START-UP OF EQUIPMENT AND SYSTEMS

- A. Whenever the manufacturer of a particular item of equipment or a particular system makes available a start-up service after completion of the installation, such manufacturer's start-up service (rendered by the manufacturer or his authorized representative) shall be provided.
- B. Witnessing and explanations of start-up services shall be included as part of the "Instruction of Owner's Personnel" as specified below.

1.11 INSTRUCTION OF OWNER'S PERSONNEL

- A. Provide the services of competent engineers or technicians acceptable to the Engineer to instruct representatives of the Owner in complete and detailed operation and maintenance of each item of equipment, and each system. These instructions shall be provided for whatever periods may be necessary to accomplish the desired results. Upon completion of these instructions, the Contractor shall obtain a letter of release, acknowledged by the Owner or his authorized representative, stating the dates on which the various kinds of instruction were given, and the personnel to whom the instructions were given.
- B. The Contractor shall be fully responsible for proper maintenance of equipment and

systems until the instructions have been given to the Owner's personnel and the letter of release acknowledged.

- C. In providing the instructions to the Owner's personnel, the written operating and maintenance manuals shall be followed in all instances, and the Owner's personnel shall be familiarized with such manuals. Operating and maintenance manuals used for instructions shall include piping diagrams, valve identification charts, control and interlocking wiring diagrams, manufacturers' operation and maintenance manuals, parts lists (with sources identified), and other data as appropriate for each system, and as required elsewhere in the Specifications to be furnished to the Owner prior to final acceptance of the project.
- D. Provide the Owner with three (3) complete sets of all maintenance manuals, pamphlets, brochures or instructions. This material shall be catalogued, indexed and bound into books.

1.12 ACCEPTABLE MANUFACTURERS

- A. A. Provide equipment and materials from listed manufacturers listed within this specification. Deviations from this specification will not be acceptable. When one manufacturer is listed, alternate materials and equipment may be provided "equal to" the listed. When more than one manufacturer is listed, equipment and material must be provided by one of the listed manufacturers.

PART 2 - PRODUCTS

2.1 STANDARD PRODUCTS

- A. Each item of equipment furnished under this Division of the Specifications shall be essentially the standard product of the manufacturer. Where two or more units of the same kind or class of equipment are required, these shall be the products of a single manufacturer; however, the component parts of the equipment need not be the products of one manufacturer.
- B. Materials and equipment shall be of the base quality normally used in good commercial practice, and shall be the products of reputable domestic manufacturers unless otherwise specified. Each major component shall bear a nameplate giving the name and address of the manufacturer, and the catalog number or designation of the component.

2.2 QUALITY AND CLASSIFICATION OF MATERIALS

- A. Materials and equipment shall be new and of the quality specified, and shall be free from defects at the time of installation. Materials or equipment damaged in shipment or otherwise damaged prior to installation shall not be repaired at the job

site, but shall be replaced with new materials or equipment identical with those damaged.

- B. Wherever a UL standard has been established for a particular type of material or equipment, each such material or equipment provided on this project shall meet the requirements of the UL standard in every way and shall be UL listed and labeled.

2.3 LOCAL PARTS AND SERVICE

- A. Each item of equipment furnished on this project shall have local representation, factory-authorized service, and an adequate stock of repair parts. "Local" shall be defined, for this purpose, as "within 50 miles of the project site."

2.4 FLAME SPREAD PROPERTIES OF MATERIALS

- A. Materials used for insulation, acoustical linings, adhesives, jackets and coatings, and combinations of these materials, shall each have a flame spread rating of 25 or less, and a smoke developed rating of 50 or less, as determined by an independent testing laboratory in accordance with NFPA-255.

2.5 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Dielectric Unions:
 - a. Watts Industries, Inc.; Water Products Div.
 - b. Zurn Industries, Inc.; Wilkins Div.
 2. Mechanical Sleeve Seals:
 - a. Calpico, Inc.
 - b. Metraflex Co.
 - c. Thunderline/Link-Seal.

2.6 MECHANICAL SLEEVE SEALS

- A. Description: Modular design, with interlocking rubber links shaped to continuously fill annular space between pipe and sleeve. Include connecting bolts and pressure plates.

2.7 PIPING SPECIALTIES

- A. Sleeves: The following materials are for wall, floor, slab, and roof penetrations:
 1. Steel Sheet Metal: 0.0239-inch minimum thickness, galvanized, round tube closed with welded longitudinal joint.
 2. Steel Pipe: ASTM A 53, Type E, Grade A, Schedule 40, galvanized, plain ends.
 3. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
 4. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - a. Underdeck Clamp: Clamping ring with set screws.

- B. Escutcheons: Manufactured wall, ceiling, and floor plates; deep-pattern type if required to conceal protruding fittings and sleeves.

1. ID: Closely fit around pipe, tube, and insulation of insulated piping.
2. OD: Completely cover opening.
3. Cast Brass: One piece, with set screw.
 - a. Finish: Rough brass.
 - b. Finish: Polished chrome-plate.

4. Cast-Iron Floor Plate: One-piece casting.

2.8 GROUT

- A. Nonshrink, Nonmetallic Grout: ASTM C 1107, Grade B.
 1. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 2. Design Mix: 5000-psi, 28-day compressive strength.
 3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. General: Install piping as described below, unless piping Sections specify otherwise. Individual Sections specify unique piping installation requirements.
- B. General Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved on Coordination Drawings.
- C. Install piping at indicated slope.
- D. Install components with pressure rating equal to or greater than system operating pressure.
- E. Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.
- F. Install piping free of sags and bends.
- G. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.
- H. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.
- I. Install piping to allow application of insulation plus 1-inch clearance around insulation.
- J. Locate groups of pipes parallel to each other, spaced to permit valve servicing.

- K. Install fittings for changes in direction and branch connections.
- L. Install couplings according to manufacturer's written instructions.
- M. Install pipe escutcheons for pipe penetrations of concrete and masonry walls, wall board partitions, and suspended ceilings according to the following:
 1. Chrome-Plated Piping: Cast brass, one piece, with set screw, and polished chrome-plated finish.
 2. Uninsulated Piping Wall Escutcheons: Cast brass or stamped steel, with set screw.
 3. Uninsulated Piping Floor Plates in Utility Areas: Cast-iron floor plates.
 4. Insulated Piping: Cast brass or stamped steel; with concealed hinge, spring clips, and chrome-plated finish.
 5. Piping in Utility Areas: Cast brass or stamped steel, with set-screw or spring clips.
- N. Sleeves are not required for core drilled holes.
- O. Install sleeves for pipes passing through concrete and masonry walls, and concrete floor and roof slabs.
- P. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 2. Build sleeves into new walls and slabs as work progresses.
 3. Install sleeves large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials: Steel Pipe Sleeves: For pipes smaller than 6-inch NPS.
 - b. Steel, Sheet-Metal Sleeves: For pipes 6-inch NPS and larger, penetrating gypsum-board partitions.
 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealants.
 5. Use Type S, Grade NS, Class 25, Use O, neutral-curing silicone sealant, unless otherwise indicated.
- Q. Aboveground, Exterior-Wall, Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe or

pipe insulation and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches in diameter.
 2. Install cast-iron "wall pipes" for sleeves 6 inches in diameter and larger.
 3. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.
- R. Underground, Exterior-Wall, Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.
- S. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestopping materials.
- T. Verify final equipment locations for roughing-in.
- U. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.
- V. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping specification Sections:
1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 3. Soldered Joints: Construct joints according to AWS's "Soldering Manual," Chapter "The Soldering of Pipe and Tube"; or CDA's "Copper Tube Handbook."
 4. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
 5. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - a. Note internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
 - b. Apply appropriate tape or thread compound to external pipe threads, unless dry seal threading is specified.
 - c. Align threads at point of assembly.
 - d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
 - e. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
6. Welded Joints: Construct joints according to AWS D10.12, "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe," using qualified processes and welding operators according to "Quality Assurance" Article.
7. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.
8. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join pipe and fittings according to the following:
 - a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - b. PVC Nonpressure Piping: ASTM D 2855.
 - c. PVC to ABS Nonpressure Transition Fittings: Procedure and solvent cement according to ASTM D 3138.
9. Plastic Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657 procedures and manufacturer's written instructions.
 - a. Plain-End Pipe and Fittings: Use butt fusion.
 - b. Plain-End Pipe and Socket Fittings: Use socket fusion.
- W. Piping Connections: Make connections according to the following, unless otherwise indicated:
 1. Install unions, in piping 2-inch NPS and smaller, adjacent to each valve and at final connection to each piece of equipment with 2-inch NPS or smaller threaded pipe connection.
 2. Install flanges, in piping 2-1/2-inch NPS and larger, adjacent to flanged valves and at final connection to each piece of equipment with flanged pipe connection.
 3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.

4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.2 EQUIPMENT AND MATERIAL INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment and material to provide maximum possible headroom, if mounting heights are not indicated.
- B. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to Architect.
- C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- D. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- E. Install equipment and ductwork giving right of way to piping installed at required slope.
- F. Install flexible connectors on equipment side of shutoff valves, horizontally and parallel to equipment shafts if possible.

3.3 PAINTING AND FINISHING

- A. Refer to paint materials, surface preparation, and application of paint.
- B. Do not paint piping specialties with factory-applied finish.
- C. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.4 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in

both directions than supported unit. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations. Use 3000-psi, 28-day compressive-strength concrete and reinforcement or as specified.

3.5 ERECTION OF METAL SUPPORTS AND ANCHORAGE

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.
- B. Field Welding: Comply with AWS D1.1, "Structural Welding Code--Steel."

3.6 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of trades involved.
- B. Repair cut surfaces to match adjacent surfaces.

3.7 GROUTING

- A. Install nonmetallic, nonshrink, grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors. Mix grout according to manufacturer's written instructions.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placing of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases to provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout according to manufacturer's written instructions.

END OF SECTION

**SECTION 23 05 29
HANGERS AND SUPPORTS**

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes hangers and supports for mechanical system piping and equipment.

1.2 DEFINITIONS

- A. MSS: Manufacturers Standardization Society for the Valve and Fittings Industry.
- B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.3 PERFORMANCE REQUIREMENTS

- A. Design channel support systems for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
- B. Design heavy-duty steel trapezes for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.

1.4 SUBMITTALS

- A. Product Data: For each type of pipe hanger, channel support system component, and thermal-hanger shield insert indicated.
- B. Shop Drawings: Signed and sealed by a qualified professional engineer for multiple piping supports and trapeze hangers. Include design calculations and indicate size and characteristics of components and fabrication details.

1.5 QUALITY ASSURANCE

- A. Engineering Responsibility: Design and preparation of Shop Drawings and calculations for each multiple pipe support and trapeze by a qualified professional engineer.
 - 1. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of hangers and supports that are similar to those indicated for this Project in material, design, and extent.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Pipe Hangers:
 - a. Globe Pipe Hanger Products, Inc.
 - b. Grinnell Corp.
 - c. Michigan Hanger Co., Inc.

2.2 MANUFACTURED UNITS

- A. Pipe Hangers, Supports, and Components: MSS SP-58, factory-fabricated components.

Refer to "Hanger and Support Applications" Article in Part 3 for where to use specific hanger and support types.

- 1. Galvanized, Metallic Coatings: For piping and equipment that will not have field-applied finish.
- 2. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

- B. Channel Support Systems: MFMA-2, factory-fabricated components for field assembly.

- 1. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

2.3 MISCELLANEOUS MATERIALS

- A. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.
- B. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

- A. Specific hanger requirements are specified in Sections specifying equipment and systems.
- B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Specification Sections.
- C. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
 - 1. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.
 - 2. Adjustable Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 2.
 - 3. Extension Hinged Clamps (MSS Type 12): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 3.
- D. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
 - 1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.
- E. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping

system Specification Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
 2. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
 3. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
 4. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.
- F. Building Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.
 2. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 3. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 4. C-Clamps (MSS Type 23): For structural shapes.
 5. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
 6. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
 7. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
 8. Malleable Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
- G. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 2. Protection Shields (MSS Type 40): Of length recommended by manufacturer to prevent crushing insulation.
- H. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification sections, install the following types:
1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.

2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches (32 mm).

3.2 HANGER AND SUPPORT INSTALLATION

- A. Pipe Hanger and Support Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- B. Channel Support System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled channel systems.
 1. Field assemble and install according to manufacturer's written instructions.
- C. Heavy-Duty Steel Trapeze Installation: Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated, heavy-duty trapezes.
 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
 2. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D-1.1.
- D. Install building attachments within concrete slabs or attach to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- E. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- F. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- G. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- H. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping," is not exceeded.
- I. Insulated Piping: Comply with the following:
 1. Attach clamps and spacers to piping.

- a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
- b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
- c. Do not exceed pipe stress limits according to ASME B31.9.
2. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
 - b. NPS 4: 12 inches long and 0.06 inch thick.
 - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
 - d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.

- e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
3. Pipes NPS 8 and Larger: Include wood inserts.
4. Insert Material: Length at least as long as protective shield.

3.3 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure above or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make smooth bearing surface.

3.4 ADJUSTING

- A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

END OF SECTION

**SECTION 23 05 30
SUPPORTS AND ANCHORS**

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Pipe, and equipment hangers, supports and associated anchors.
- B. Sleeves and seals.
- C. Flashing and sealing equipment and pipe stacks.

1.2 SUBMITTALS

- D. Submit shop drawings and product data under provisions of specification.
- E. Indicate hanger and support framing and attachment methods.

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

- A. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch Malleable iron, adjustable swivel, split ring.
- B. Hangers for Pipe Sizes 2 to 4 Inches Carbon steel, adjustable, clevis.
- C. Hangers for Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roll, double hanger.
- D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods; cast iron roll and stand for pipe sizes 6 inches and over.
- E. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
- F. Wall Support for Pipe Sizes 4 Inches and over: adjustable steel yoke and cast iron roll.
- G. Vertical Support: Steel riser clamp.
- H. Floor Support for Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, locknut nipple, floor flange, and concrete pier or steel support.
- I. Floor Support for Pipe Sizes 6 Inches and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
- J. Roof Pipe Supports and Hangers: Galvanized Steel Channel System as manufactured by Portable Pipe Hangers, Inc. or approved equal.
For pipes 2-1/2" and smaller – Type PP10 with roller
For pipes 3" through 8" – Type PS
For multiple pipes – Type PSE - Custom
- K. Copper Pipe Support and Hangers: Electro-galvanized with thermoplastic elastomer cushions; Unistrut "Cush-A-Clamp" or equal. Hangers: Plastic coated; Unistrut or equal.
- L. For installation of protective shields refer to specification section 15140-3.03.
- M. Shields for Vertical Copper Pipe Risers: Sheet lead.
- N. Pipe Rough-In Supports in Walls/Chases:

Provide preformed plastic pipe supports, Sioux Chief "Pipe Titan", Holdrite or equal.

2.2 HANGER RODS

- A. Galvanized Hanger Rods: Threaded both ends, threaded 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: 20 gage galvanized steel.
- B. Lead Flashing: 4 lb. /sq. ft. sheet lead for waterproofing; 1 lb. /sq. ft. sheet lead for soundproofing.
- C. Caps: Steel, 20 gage minimum; 16 gage at fire resistant elements.
- D. Coordinate with roofing contractor/architect for type of flashing on metal roofs.

2.5 EQUIPMENT CURBS

- A. Fabricate curbs of hot dipped galvanized steel.

2.6 SLEEVES

- A. Sleeves for Pipes through Non-fire Rated Floors: Form with 18 gage galvanized steel, tack welded to form a uniform sleeve.
- B. Sleeves for Pipes through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Form with steel pipe, schedule 40.
- C. Sleeves for Pipes through Fire Rated and Fire Resistive Floors and Walls, and Fireproofing: Prefabricated fire rated steel sleeves including seals, UL listed.
- D. Sleeves for Round Ductwork: Form with galvanized steel.
- E. Sleeves for Rectangular Ductwork: Form with galvanized steel.
- F. Fire Stopping Insulation: Glass fiber type, non-combustible, U.L. listed.
- G. Caulk: Paintable 25-year acrylic sealant.
- H. Pipe Alignment Guides: Factory fabricated, of cast semi-steel or heavy fabricated steel, consisting of bolted, two-section outer cylinder and base with two-section guiding spider that bolts tightly to pipe. Length of guides shall be as recommended by manufacturer to allow indicated travel.

2.7 FABRICATION

- A. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- B. Design hangers without disengagement of supported pipe.

- C. Design roof supports without roof penetrations, flashing or damage to the roofing material.

2.8 FINISH

- A. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

PART 3 - EXECUTION

3.1 INSERTS

- A. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams. Coordinate with structural engineer for placement of inserts.
- B. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
- C. Where concrete slabs form finished ceiling, provide inserts to be flush with slab surface.
- D. Where inserts are omitted, drill through concrete slab from below and provide thru-bolt with recessed square steel plate and nut recessed into and grouted flush with slab. Verify with structural engineer prior to start of work.

3.2 PIPE HANGERS AND SUPPORTS

- E. Support horizontal piping as follows:

PIPE SIZE	MAX. HANGER SPACING	HANGER DIAMETER
(Steel Pipe)		
1/2 to 1-1/4 inch	7'-0"	3/8"
1-1/2 to 3 inch	10'-0"	3/8"
4 to 6 inch	10'-0"	1/2"
8 to 10 inch	10'-0"	5/8"
12 to 14 inch	10'-0"	3/4"
15 inch and over	10'-0"	7/8"
(Copper Pipe)		
1/2 to 1-1/4 inch	5'-0"	3/8"
1-1/2 to 2-1/2 inch	8'-0"	3/8"
3 to 4 inch	10'-0"	3/8"
6 to 8 inch	10'-0"	1/2"
(Cast Iron)		
2 to 3 inch	5'-0"	3/8"

4 to 6 inch	10'-0"	1/2"
8 to 10 inch	10'-0"	5/8"
12 to 14 inch	10'-0"	3/4"
15 inch and over	10'-0"	7/8"
(PVC Pipe)		
1-1/2 to 4 inch	4'-0"	3/8"
6 to 8 inch	4'-0"	1/2"
10 and over	4'-0"	5/8"

- F. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
- G. Place a hanger within 12 inches of each horizontal elbow and at the vertical horizontal transition.
- H. D. Use hangers with 1-1/2 inch minimum vertical adjustment.
- I. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.
- J. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.
- K. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- L. Support riser piping independently of connected horizontal piping.
- M. Install hangers with nut at base and above hanger; tighten upper nut to hanger after final installation adjustments.
- N. Portable pipe hanger systems shall be installed per manufacturers' instructions.
- O. Distances between supports are maximum distance. Supports shall be provided to carry the pipe/equipment load.

3.3 Insulated Piping: Comply with the following installation requirements.

- A. Clamps: Attach galvanized clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ASME B31.9.
- B. Saddles: Install galvanized protection saddles MSS Type 39 where insulation without vapor barrier is indicated. Fill interior voids with segments of insulation that match adjoining pipe insulation.
- C. Shields: Install protective shields MSS Type 40 on cold and chilled water piping that has vapor barrier. Shields shall span an arc of 180 degrees and shall have dimensions in inches not less than the following:

NPS	LENGTH	THICKNESS
1/4 THROUGH 3-1/2	12	0.048
4	12	0.060
5 & 6	18	0.060
8 THROUGH 14	24	0.075
16 THROUGH 24	24	0.105

larger provide galvanized sheet metal shields with calcium silicate at hangers/supports.

- E. Insert material shall be at least as long as the protective shield.
- F. Thermal Hanger Shields: Install where indicated, with insulation of same thickness as piping.

3.4 EQUIPMENT BASES AND SUPPORTS

- A. Provide equipment bases of concrete.
- B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.
- C. Construct support of steel members. Brace and fasten with flanges bolted to structure.
- D. Provide rigid anchors for pipes after vibration isolation components are installed.

3.5 FLASHING

- A. Provide flexible flashing and metal counter flashing where piping and ductwork penetrate weather or waterproofed walls,

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floors, and roofs.

- B. Flash vent and soil pipes projecting 8 inches minimum above finished roof surface with lead worked one inch minimum into hub, 8 inches minimum clear on sides with 24 x 24 inches sheet size. For pipes through outside walls, turn flanges back into wall and caulk, metal counter flash and seal.
- C. Flash floor drains in floors with topping over finished areas with lead, 10 inches clear on sides with minimum 36 x 36 inch sheet size. Fasten flashing to drain clamp device.
- D. Seal floor shower mop sink and all other drains watertight to adjacent materials.
- E. Provide curbs for mechanical roof installations 8 inches minimum high above roofing surface. Contact architect for all flashing details and roof construction. Seal penetrations watertight.

3.6 SLEEVES

- A. Set sleeves in position in formwork. Provide reinforcing around sleeves.
- B. Extend sleeves through floors minimum one inch above finished floor level. Caulk sleeves full depth with fire rated thermfiber and 3M caulking and provide floor plate.
- C. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with U.L. listed fire stopping insulation and caulk seal air tight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- D. Fire protection sleeves may be flush with floor of stairways.

END OF SECTION

SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes testing, adjusting, and balancing HVAC systems to produce design objectives, including the following:
 - 1. Balancing airflow within distribution systems, including submains, branches, and terminals, to indicated quantities according to specified tolerances.
 - 2. Adjusting total HVAC systems to provide indicated quantities.
 - 3. Measuring electrical performance of HVAC equipment.
 - 4. Setting quantitative performance of HVAC equipment.
 - 5. Verifying that automatic control devices are functioning properly.
 - 6. Reporting results of the activities and procedures specified in this Section.
- B. Related Sections include the following:
 - 1. Testing and adjusting requirements unique to particular systems and equipment are included in the Sections that specify those systems and equipment.
 - 2. Field quality-control testing to verify that workmanship quality for system and equipment installation is specified in system and equipment Sections.

1.2 DEFINITIONS

- A. Adjust: To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.
- B. Balance: To proportion flows within the distribution system, including submains, branches, and terminals, according to design quantities.
- C. Draft: A current of air, when referring to localized effect caused by one or more factors of high air velocity, low ambient temperature, or direction of airflow, whereby more heat is withdrawn from a person's skin than is normally dissipated.
- D. Procedure: An approach to and execution of a sequence of work operations to yield repeatable results.
- E. Report Forms: Test data sheets for recording test data in logical order.
- F. Static Head: The pressure due to the weight of the fluid above the point of measurement. In a closed system, static head is equal on both sides of the pump.
- G. Suction Head: The height of fluid surface above the centerline of the pump on the suction side.
- H. System Effect: A phenomenon that can create undesired or unpredicted conditions

that cause reduced capacities in all or part of a system.

- I. System Effect Factors: Allowances used to calculate a reduction of the performance ratings of a fan when installed under conditions different from those presented when the fan was performance tested.
- J. Terminal: A point where the controlled medium, such as fluid or energy, enters or leaves the distribution system.
- K. Test: A procedure to determine quantitative performance of a system or equipment.
- L. Testing, Adjusting, and Balancing Agent: The entity responsible for performing and reporting the testing, adjusting, and balancing procedures.
- M. AABC: Associated Air Balance Council.
- N. CTI: Cooling Tower Institute.
- O. NEBB: National Environmental Balancing Bureau.
- P. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.

1.3 SUBMITTALS

- A. Quality-Assurance Submittals: Within 30 days from the Contractor's Notice to Proceed, submit 2 copies of evidence that the testing, adjusting, and balancing Agent and this Project's testing, adjusting, and balancing team members meet the qualifications specified in the "Quality Assurance" Article below.
- B. Certified Testing, Adjusting, and Balancing Reports: Submit 2 copies of reports prepared, as specified in this Section, on approved forms certified by the testing, adjusting, and balancing Agent.
- C. Warranty: Submit 2 copies of special warranty specified in the "Warranty" Article below.

1.4 QUALITY ASSURANCE

- A. Agent Qualifications for larger projects: Engage a testing, adjusting, and balancing agent certified by AABC.
- B. Agent Qualifications for smaller projects: Engage a testing, adjusting, and balancing agent certified by NEBB.
- C. Certification of Testing, Adjusting, and Balancing Reports: Certify the testing, adjusting, and balancing field data reports. This certification includes the following:
 - 1. Review field data reports to validate accuracy of data and to prepare certified testing, adjusting, and balancing reports.
 - 2. Certify that the testing, adjusting, and balancing team complied with the approved testing, adjusting, and balancing plan and the procedures

specified and referenced in this Specification.

- D. Testing, Adjusting, and Balancing Reports: Use standard forms from AABC's "National Standards for Testing, Adjusting, and Balancing."
- E. Testing, Adjusting, and Balancing Reports: Use standard forms from NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."
- F. Instrumentation Type, Quantity, and Accuracy: As described in AABC national standards.
- G. Instrumentation Type, Quantity, and Accuracy: As described in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems," Section II, "Required Instrumentation for NEBB Certification."
- H. Instrumentation Calibration: Calibrate instruments at least every 6 months or more frequently if required by the instrument manufacturer.

1.5 PROJECT CONDITIONS

- A. Partial Owner Occupancy: The Owner may occupy completed areas of the building before Substantial Completion. Cooperate with the Owner during testing, adjusting, and balancing operations to minimize conflicts with the Owner's operations.

1.6 COORDINATION

- A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist testing, adjusting, and balancing activities.
- B. Notice: Provide 7 days' advance notice for each test. Include scheduled test dates and times.
- C. Perform testing, adjusting, and balancing after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

1.7 WARRANTY

- A. General Warranty: The national project performance guarantee specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine Contract Documents to become familiar with project requirements and to discover conditions in systems' designs that

may preclude proper testing, adjusting, and balancing of systems and equipment.

1. Contract Documents are defined in the General and Supplementary Conditions of the Contract.
 2. Verify that balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are required by the Contract Documents. Verify that quantities and locations of these balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- B. Examine approved submittal data of HVAC systems and equipment.
 - C. Examine project record documents described in specifications.
 - D. Examine Architect's and Engineer's design data, including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
 - E. Examine equipment performance data, including fan and pump curves. Relate performance data to project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system. Calculate system effect factors to reduce the performance ratings of HVAC equipment when installed under conditions different from those presented when the equipment was performance tested at the factory. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," Sections 7 through 10; or in SMACNA's "HVAC Systems--Duct Design," Sections 5 and 6. Compare this data with the design data and installed conditions.
 - F. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Specification Sections have been performed.
 - G. Examine system and equipment test reports.
 - H. Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are properly installed, and their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.

- I. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.
- J. Examine air-handling equipment to ensure clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- K. Examine terminal units, such as variable-air-volume boxes and mixing boxes, to verify that they are accessible and their controls are connected and functioning.
- L. Examine equipment for installation and for properly operating safety interlocks and controls.
- M. Examine automatic temperature system components to verify the following:
 - 1. Dampers, valves, and other controlled devices operate by the intended controller.
 - 2. Dampers and valves are in the position indicated by the controller.
 - 3. Integrity of valves and dampers for free and full operation and for tightness of fully closed and fully open positions. This includes dampers in multizone units, mixing boxes, and variable-air-volume terminals.
 - 4. Thermostats and humidistats are located to avoid adverse effects of sunlight, drafts, and cold walls.
 - 5. Sensors are located to sense only the intended conditions.
 - 6. Sequence of operation for control modes is according to the Contract Documents.
 - 7. Controller set points are set at design values. Observe and record system reactions to changes in conditions. Record default set points if different from design values.
 - 8. Interlocked systems are operating.
 - 9. Changeover from heating to cooling mode occurs according to design values.
- N. Report deficiencies discovered before and during performance of testing, adjusting, and balancing procedures.

3.2 PREPARATION

- A. Complete system readiness checks and prepare system readiness reports. Verify the following:
 - 1. Permanent electrical power wiring is complete.
 - 2. Automatic temperature-control systems are operational.
 - 3. Equipment and duct access doors are securely closed.
 - 4. Balance, fire dampers are open.
 - 5. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.

- 6. Windows and doors can be closed so design conditions for system operations can be met.

3.3 GENERAL TESTING AND BALANCING PROCEDURES

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC national standards and this Section.
- B. Perform testing and balancing procedures on each system according to the procedures contained in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and this Section.
- C. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to the insulation Specifications for this Project.
- D. Mark equipment settings with paint or other suitable, permanent identification material, including damper-control positions, valve indicators, fan-speed-control levers, and similar controls and devices, to show final settings.

3.4 FUNDAMENTAL AIR SYSTEMS' BALANCING PROCEDURES

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. For variable-air-volume systems, develop a plan to simulate diversity.
- D. Check the airflow patterns from the outside-air louvers and dampers and the return- and exhaust-air dampers, through the supply-fan discharge and mixing dampers.
- E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- F. Verify that motor starters are equipped with properly sized thermal protection.
- G. Check dampers for proper position to achieve desired airflow path.
- H. Check for airflow blockages.
- I. Check condensate drains for proper connections and functioning.
- J. Check for proper sealing of air-handling unit components.

3.5 CONSTANT-VOLUME AIR SYSTEMS' BALANCING PROCEDURES

- A. The procedures in this Article apply to constant-volume supply-, return-, and exhaust-air systems.

- B. Adjust fans to deliver total design airflows within the maximum allowable rpm listed by the fan manufacturer.
 - 1. Measure fan static pressures to determine actual static pressure as follows:
 - a. Measure outlet static pressure as far downstream from the fan as practicable and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from flexible connection and downstream from duct restrictions.
 - 2. Measure static pressure across each air-handling unit component.
 - a. Simulate dirty filter operation and record the point at which maintenance personnel must change filters.
 - 3. Compare design data with installed conditions to determine variations in design static pressures versus actual static pressures. Compare actual system effect factors with calculated system effect factors to identify where variations occur. Recommend corrective action to align design and actual conditions.
 - 4. Adjust fan speed higher or lower than design with the approval of the Architect. Make required adjustments to pulley sizes, motor sizes, and electrical connections to accommodate fan-speed changes.
 - 5. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure no overload will occur. Measure amperage in full cooling, full heating, and economizer modes to determine the maximum required brake horsepower.
- C. Adjust volume dampers for main duct, submain ducts, and major branch ducts to design airflows within specified tolerances.
 - 1. Measure static pressure at a point downstream from the balancing damper and adjust volume dampers until the proper static pressure is achieved.
 - a. Where sufficient space in submains and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
 - 2. Remeasure each submain and branch duct after all have been adjusted.

Continue to adjust submains and branch ducts to design airflows within specified tolerances.

- D. Measure terminal outlets and inlets without making adjustments.
 - 1. Measure terminal outlets using a direct-reading hood or the outlet manufacturer's written instructions and calculating factors.
- E. Adjust terminal outlets and inlets for each space to design airflows within specified tolerances of design values. Make adjustments using volume dampers rather than extractors and the dampers at the air terminals.
 - 1. Adjust each outlet in the same room or space to within specified tolerances of design quantities without generating noise levels above the limitations prescribed by the Contract Documents.
 - 2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.6 MOTORS

- A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
 - 1. Manufacturer, model, and serial numbers.
 - 2. Motor horsepower rating.
 - 3. Motor rpm.
 - 4. Efficiency rating if high-efficiency motor.
 - 5. Nameplate and measured voltage, each phase.
 - 6. Nameplate and measured amperage, each phase.
 - 7. Starter thermal-protection-element rating.
- B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass for the controller to prove proper operation. Record observations, including controller manufacturer, model and serial numbers, and nameplate data.

3.7 CONDENSING UNITS

- A. Verify proper rotation of fans and measure entering- and leaving-air temperatures. Record compressor data.

3.8 HEAT-TRANSFER COILS

- A. Electric-Heating Coils: Measure the following data for each coil:
 - 1. Nameplate data.
 - 2. Airflow.
 - 3. Entering- and leaving-air temperatures at full load.
 - 4. Voltage and amperage input of each phase at full load and at each incremental stage.
 - 5. Calculated kW at full load.
 - 6. Fuse or circuit-breaker rating for overload protection.

3.9 TEMPERATURE TESTING

- A. During testing, adjusting, and balancing, report need for adjustment in temperature regulation within the automatic temperature-control system.
- B. Measure outside-air, wet- and dry-bulb temperatures.

3.10 TEMPERATURE-CONTROL VERIFICATION

- A. Verify that controllers are calibrated and commissioned.
- B. Check transmitter and controller locations and note conditions that would adversely affect control functions.
- C. Record controller settings and note variances between set points and actual measurements.
- D. Verify operation of limiting controllers (i.e., high- and low-temperature controllers).
- E. Verify free travel and proper operation of control devices such as damper and valve operators.
- F. Verify sequence of operation of control devices. Note air pressures and device positions and correlate with airflow and water-flow measurements. Note the speed of response to input changes.
- G. Confirm interaction of electrically operated switch transducers.
- H. Confirm interaction of interlock and lockout systems.
- I. Verify main control supply-air pressure and observe compressor and dryer operations.
- J. Record voltages of power supply and controller output. Determine if the system operates on a grounded or nongrounded power supply.
- K. Note operation of electric actuators using spring return for proper fail-safe operations.

3.11 TOLERANCES

- A. Set HVAC system airflow and water flow rates within the following tolerances:
 - 1. Supply and Exhaust Fans: Plus 5 to plus 10 percent.
 - 2. Air Outlets and Inlets: 0 to minus 10 percent.
 - 3. Cooling-Water Flow Rate: 0 to minus 5 percent.

3.12 FINAL REPORT

- A. General: Typewritten, or computer printout in letter-quality font, on standard bond paper, in 3-ring binder, tabulated and divided into sections by tested and balanced systems.
- B. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing engineer.
 - 1. Include a list of the instruments used for procedures, along with proof of calibration.
- C. Final Report Contents: In addition to the certified field report data, include the following:

- 1. Fan curves.
- 2. Manufacturers' test data.
- 3. Field test reports prepared by system and equipment installers.
- 4. Other information relative to equipment performance, but do not include approved Shop Drawings and Product Data.
- D. General Report Data: In addition to the form titles and entries, include the following data in the final report, as applicable:
 - 1. Title page.
 - 2. Name and address of testing, adjusting, and balancing Agent.
 - 3. Project name.
 - 4. Project location.
 - 5. Architect's name and address.
 - 6. Engineer's name and address.
 - 7. Contractor's name and address.
 - 8. Report date.
 - 9. Signature of testing, adjusting, and balancing Agent who certifies the report.
 - 10. Summary of contents, including the following:
 - a. Design versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 - 11. Nomenclature sheets for each item of equipment.
 - 12. Data for terminal units, including manufacturer, type size, and fittings.
 - 13. Notes to explain why certain final data in the body of reports vary from design values.
 - 14. Test conditions for fans and pump performance forms, including the following:
 - a. Settings for outside-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Face and bypass damper settings at coils.
 - e. Fan drive settings, including settings and percentage of maximum pitch diameter.
 - f. Settings for supply-air, static-pressure controller.
 - g. Other system operating conditions that affect performance.
- E. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present with single-line diagrams and include the following:
 - 1. Quantities of outside, supply, return, and exhaust airflows.
 - 2. Water and steam flow rates.
 - 3. Duct, outlet, and inlet sizes.

4. Pipe and valve sizes and locations.
5. Terminal units.
6. Balancing stations.
- F. Roof Top Unit Test Reports: For air-handling units with coils, include the following:
 1. Unit Data: Include the following:
 - a. Unit identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and unit size.
 - e. Manufacturer's serial number.
 - f. Unit arrangement and class.
 - g. Discharge arrangement.
 - h. Sheave make, size in inches (mm), and bore.
 - i. Number of belts, make, and size.
 - j. Number of filters, type, and size.
 2. Motor Data: Include the following:
 - a. Make and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 3. Test Data: Include design and actual values for the following:
 - a. Total airflow rate in cfm (L/s).
 - b. Total system static pressure in inches wg (Pa).
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg (Pa).
 - e. Preheat coil static-pressure differential in inches wg (Pa).
 - f. Cooling coil static-pressure differential in inches wg (Pa).
 - g. Heating coil static-pressure differential in inches wg (Pa).
 - h. Outside airflow in cfm (L/s).
 - i. Return airflow in cfm (L/s).
 - j. Outside-air damper position.
 - k. Return-air damper position.
 - l. Discharge air temperature
- G. Electric-Coil Test Reports: For electric duct coils, and electric coils installed in central-station air-handling units, include the following:
 1. Unit Data: Include the following:
 - a. System identification.
 - b. Location.
 - c. Coil identification.
 - d. Capacity in Btuh (kW).
 - e. Number of stages.
 - f. Connected volts, phase, and hertz.
 - g. Rated amperage.
 - h. Discharge air temperature
 2. Test Data: Include design and actual values for the following:
 - a. Heat output in Btuh (kW).
 - b. Airflow rate in cfm (L/s).
 - c. Air velocity in fpm (m/s).
 - d. Entering-air temperature in deg F (deg C).
 - e. Leaving-air temperature in deg F (deg C).
 - f. Voltage at each connection.
 - g. Amperage for each phase.
- H. Fan Test Reports: For exhaust fans, include the following:
 1. Fan Data: Include the following:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 2. Motor Data: Include the following:
 - a. Make and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Number of belts, make, and size.
 3. Test Data: Include design and actual values for the following:
 - a. Total airflow rate in cfm (L/s).
 - b. Total system static pressure in inches wg (Pa).
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg (Pa).
 - e. Suction static pressure in inches wg (Pa).
- I. Condenser Reports: For refrigerant side of unitary systems, stand-alone refrigerant compressors, air-cooled condensing units, include the following:
 1. Unit Data: Include the following:
 - a. Unit identification.
 - b. Location.
 - c. Unit make and model number.
 - d. Manufacturer's compressor serial numbers.
 - e. Compressor make.
 - f. Compressor model and serial numbers.
 - g. Refrigerant weight in lb (kg).
 2. Test Data: Include design and actual values for the following:
 - a. Entering-air, dry-bulb temperature in deg F (deg C).
 - b. Leaving-air, dry-bulb temperature in deg F (deg C).
 - c. Control settings.
 - d. Unloader set points.
 - e. Low-pressure-cutout set point in psig (kPa).
 - f. High-pressure-cutout set point in psig (kPa).
 - g. Suction pressure in psig (kPa).
 - h. Suction temperature in deg F (deg C).
 - i. Condenser refrigerant pressure in psig (kPa).

- j. Condenser refrigerant temperature in deg F (deg C).
- k. Oil pressure in psig (kPa).
- l. Oil temperature in deg F (deg C).
- m. Voltage at each connection.
- n. Amperage for each phase.
- o. The kW input.
- p. Number of fans.

3.13 ADDITIONAL TESTS

- A. Within 90 days of completing testing, adjusting, and balancing, perform additional testing and balancing to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

END OF SECTION

SECTION 23 06 01
MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions.

1.2 SUMMARY

- A. This Section includes the following mechanical identification materials and their installation:
 - 1. Equipment nameplates.
 - 2. Equipment markers.
 - 3. Access panel and door markers.
 - 4. Pipe markers.
 - 5. Duct markers.
 - 6. Valve tags.

1.3 SUBMITTALS

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

1.4 COORDINATION

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

PART 2 - PRODUCTS

2.1 EQUIPMENT IDENTIFICATION DEVICES

- A. Equipment Nameplates: Metal, with data engraved or stamped, for permanent attachment on equipment.
 - 1. Data:
 - a. Manufacturer, product name, model number, and serial number.
 - b. Capacity, operating and power characteristics, and essential data.
 - c. Labels of tested compliances.
 - 2. Location: Accessible and visible.
 - 3. Fasteners: As required to mount on equipment.
- B. Equipment Markers: Engraved, color-coded laminated plastic. Include contact-type, permanent adhesive.
 - 1. Terminology: Match schedules as closely as possible.
 - 2. Data:
 - a. Name and plan number.
 - b. Equipment service.
 - c. Design capacity.
 - d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.
 - 3. Size: **2-1/2 by 4 inches (64 by 100 mm)** for control devices, dampers, and valves; **4-1/2 by 6 inches (115 by 150 mm)** for equipment.

- 4. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.

2.2 PIPING IDENTIFICATION DEVICES

- A. Manufactured Pipe Markers, General: Preprinted, color-coded, with lettering indicating service, and showing direction of flow.
 - 1. Colors: Comply with ASME A13.1, unless otherwise indicated.
 - 2. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.
 - 3. Pipes with OD, Including Insulation, Less Than **6 Inches (150 mm)**: Full-band pipe markers extending 360 degrees around pipe at each location.
 - 4. Pipes with OD, Including Insulation, **6 Inches (150 mm)** and Larger: Either full-band or strip-type pipe markers at least three times letter height and of length required for label.
 - 5. Arrows: Integral with piping system service lettering to accommodate both directions; or as separate unit on each pipe marker to indicate direction of flow.
- B. Pretensioned Pipe Markers: Precoiled semirigid plastic formed to cover full circumference of pipe and to attach to pipe without adhesive.
- C. Shaped Pipe Markers: Preformed semirigid plastic formed to partially cover circumference of pipe and to attach to pipe with mechanical fasteners that do not penetrate insulation vapor barrier.
- D. Self-Adhesive Pipe Markers: Plastic with pressure-sensitive, permanent-type, self-adhesive back.
- E. Plastic Tape: Continuously printed, vinyl tape at least **3 mils (0.08 mm)** thick with pressure-sensitive, permanent-type, self-adhesive back.
 - 1. Width for Markers on Pipes with OD, Including Insulation, Less Than **6 Inches (150 mm)**: **3/4 inch (19 mm)** minimum.
 - 2. Width for Markers on Pipes with OD, Including Insulation, **6 Inches (150 mm)** or Larger: **1-1/2 inches (38 mm)** minimum.

2.3 DUCT IDENTIFICATION DEVICES

- A. Duct Markers: Engraved, color-coded laminated plastic. Include direction and quantity of airflow and duct service (such as supply, return, and exhaust). Include contact-type, permanent adhesive.

2.4 VALVE TAGS

- A. Valve Tags: Stamped or engraved with **1/4-inch (6.4-mm)** letters for piping system abbreviation and **1/2-inch (13-mm)** numbers,

with numbering scheme [approved by Architect] <Insert other>. Provide 5/32-inch (4-mm) hole for fastener.

1. Material: 3/32-inch- (2.4-mm-) thick laminated plastic with 2 black surfaces and white inner layer.
2. Valve-Tag Fasteners: Brass wire-link or beaded chain; or S-hook.

PART 3 - EXECUTION

3.1 APPLICATIONS, GENERAL

- A. Products specified are for applications referenced in other Divisions. If more than single-type material, device, or label is specified for listed applications, selection is Installer's option.

3.2 EQUIPMENT IDENTIFICATION

- A. Install and permanently fasten equipment nameplates on each major item of mechanical equipment that does not have nameplate or has nameplate that is damaged or located where not easily visible. Locate nameplates where accessible and visible. Include nameplates for the following general categories of equipment:
 1. Pumps, compressors, chillers, condensers, and similar motor-driven units.
 2. Heat exchangers, coils, evaporators, and similar equipment.
 3. Fans, blowers, primary balancing dampers, and mixing boxes.
 4. Packaged HVAC central-station and zone-type units.
- B. Install equipment markers with permanent adhesive on or near each major item of mechanical equipment. Data required for markers may be included on signs, and markers may be omitted if both are indicated.
 1. Letter Size: Minimum 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 2. Data: Distinguish among multiple units, indicate operational requirements, indicate safety and emergency precautions, warn of hazards and improper operations, and identify units.
 3. Locate markers where accessible and visible. Include markers for the following general categories of equipment:
 - a. Main control and operating valves, including safety devices and hazardous units such as gas outlets.
 - b. Fire department hose valves and hose stations.
 - c. Meters, gages, thermometers, and similar units.

- d. Pumps, compressors, chillers, condensers, and similar motor-driven units.
 - e. Heat exchangers, coils, evaporators, and similar equipment.
 - f. Fans, blowers, primary balancing dampers, and mixing boxes.
 - g. Packaged HVAC central-station and zone-type units.
 - h. Strainers, filters, humidifiers, water-treatment systems, and similar equipment.
- C. Install equipment signs with screws or permanent adhesive on or near each major item of mechanical equipment. Locate signs where accessible and visible.
 1. Identify mechanical equipment with equipment markers in the following color codes:
 - a. Green: For cooling equipment and components.
 - b. Yellow: For heating equipment and components.
 - c. Orange: For combination cooling and heating equipment and components.
 2. Letter Size: Minimum 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 3. Data: Distinguish among multiple units, indicate operational requirements, indicate safety and emergency precautions, warn of hazards and improper operations, and identify units.
 4. Include signs for the following general categories of equipment:
 - a. Main control and operating valves, including safety devices.
 - b. Pumps, compressors, chillers, condensers, and similar motor-driven units.
 - c. Heat exchangers, coils, evaporators, and similar equipment.
 - d. Fans, blowers, primary balancing dampers, and mixing boxes.
 - e. Packaged HVAC central-station and zone-type units.
 - f. Tanks and pressure vessels.
 - g. Strainers, filters, humidifiers, water-treatment systems, and similar equipment.
 - D. Install access panel markers with screws on equipment access panels.

3.3 PIPING IDENTIFICATION

- A. Install manufactured pipe markers indicating service on each piping system. Install with

flow indication arrows showing direction of flow.

1. Pipes with OD, Including Insulation, Less Than **6 Inches (150 mm)**: Pretensioned pipe markers. Use size to ensure a tight fit.
 2. Pipes with OD, Including Insulation, **6 Inches (150 mm)** and Larger: Self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, at least **1-1/2 inches (38 mm)** wide, lapped at least **3 inches (75 mm)** at both ends of pipe marker, and covering full circumference of pipe.
- B. Locate pipe markers and color bands where piping is exposed in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior nonconcealed locations as follows:
1. Near each valve and control device.
 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 3. Near penetrations through walls, floors, ceilings, and nonaccessible enclosures.
 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 5. Near major equipment items and other points of origination and termination.
 6. Spaced at maximum intervals of **50 feet (15 m)** along each run. Reduce intervals to **25 feet (7.6 m)** in areas of congested piping and equipment.
 7. On piping above removable acoustical ceilings. Omit intermediately spaced markers.

3.4 DUCT IDENTIFICATION

- A. Install duct markers with permanent adhesive on air ducts in the following color codes:
1. Green: For cold-air supply ducts.
 2. Blue: For exhaust-, outside-, relief-, return-, and mixed-air ducts.
 3. ASME A13.1 Colors and Designs: For hazardous material exhaust.
 4. Letter Size: Minimum **1/4 inch (6.4 mm)** for name of units if viewing distance is less than **24 inches (600 mm)**, **1/2 inch (13 mm)** for viewing distances up to **72 inches (1830**

mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

- B. Locate markers near points where ducts enter into concealed spaces and at maximum intervals of **50 feet (15 m)** in each space where ducts are exposed or concealed by removable ceiling system.

3.5 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; plumbing fixture supply stops; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following:
1. Valve-Tag Size and Shape:
 - a. Cold Water: **1-1/2 inches (38 mm)**, round.
 - b. Hot Water: **1-1/2 inches (38 mm)**, round.
 - c. Fire Protection: **2 inches (50 mm)**, round.
 - C. Valve-Tag Color:
 - a. Cold Water: Green.
 - b. Hot Water: Yellow.
 - c. Fire Protection: Red.
 2. Letter Color:
 - a. Cold Water: White.
 - b. Hot Water: White.
 - c. Fire Protection: White.

3.6 VALVE-SCHEDULE INSTALLATION

- A. Mount valve schedule on wall in accessible location in each major equipment room.

3.7 ADJUSTING

- A. Relocate mechanical identification materials and devices that have become visually blocked by other work.

3.8 CLEANING

- A. Clean faces of mechanical identification devices and glass frames of valve schedules.

END OF SECTION

**SECTION 23 26 00
CONDENSATE DRAIN PIPING**

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Coordinate installation of condensate drain piping with Section 22 0501 as described in Contract Documents.

1.2 REFERENCES

- A. Reference Standards:
 - 1. ASTM International:
 - a. ASTM B88-09, 'Standard Specification for Seamless Copper Water Tube'.
 - b. ASTM D1785-12, 'Standard Specification for Poly (Vinyl Chloride)

(PVC) Plastic Pipe, Schedules 40, 80, and 120'.

PART 2 - PRODUCTS

2.1 SYSTEMS

- A. Materials:
 - 1. Condensate Drains:
 - a. Exterior And Interior Lines: Type M copper meeting requirements of ASTM B88.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Condensate Drains:
 - 1. Support piping and protect from damage.

END OF SECTION

**SECTION 23 31 00
DUCT ACCESSORIES**

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Backdraft dampers.
 - 2. Manual-volume dampers.
 - 3. Fire dampers.
 - 4. Turning vanes.
 - 5. Duct-mounted access doors and panels.
 - 6. Flexible ducts.
 - 7. Flexible connectors.
 - 8. Duct accessory hardware.

1.2 SUBMITTALS

- A. Product Data: For the following:
 - 1. Backdraft dampers.
 - 2. Manual-volume dampers.
 - 3. Fire dampers.
 - 4. Duct-mounted access doors and panels.
 - 5. Flexible ducts.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loadings, required clearances, method of field assembly, components, location, and size of each field connection. Detail the following:
 - 1. Special fittings and manual- and automatic-volume-damper installations.
 - 2. Fire-damper installations, including sleeves and duct-mounted access doors and panels.
- C. Product Certificates: Submit certified test data on dynamic insertion loss; self-noise power levels; and airflow performance data, static-pressure loss, dimensions, and weights.

1.3 QUALITY ASSURANCE

- A. NFPA Compliance: Comply with the following NFPA standards:
 - 1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
 - 2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

1.4 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
 - 1. Fusible Links: Furnish quantity equal to 10 percent of amount installed.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

- A. Galvanized, Sheet Steel: Lock-forming quality; ASTM A 653/A 653M, G90 (Z275) coating designation; mill-phosphatized finish for surfaces of ducts exposed to view.
- B. Carbon-Steel Sheets: ASTM A 366/A 366M, cold-rolled sheets, commercial quality, with oiled, exposed matte finish.
- C. Reinforcement Shapes and Plates: Galvanized steel reinforcement where installed on galvanized, sheet metal ducts;

compatible materials for aluminum and stainless-steel ducts.

- D. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for 36-inch (900-mm) length or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.2 BACKDRAFT DAMPERS

- A. Description: Suitable for horizontal or vertical installations.
- B. Frame: 0.052-inch- (1.3-mm-) thick, galvanized, sheet steel, with welded corners and mounting flange.
- C. Blades: 0.025-inch- (0.6-mm-) thick, roll-formed aluminum.
- D. Blade Seals: Vinyl.
- E. Blade Axles: Galvanized steel.
- F. Tie Bars and Brackets: Galvanized steel.
- G. Return Spring: Adjustable tension.

2.3 MANUAL-VOLUME DAMPERS

- A. General: Factory fabricated with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.
- B. Standard Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, standard leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications.
 - 1. Steel Frames: Hat-shaped, galvanized, sheet steel channels, minimum of 0.064 inch (1.62 mm) thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls; and flangeless frames where indicated for installing in ducts.
 - 2. Roll-Formed Steel Blades: 0.064-inch- (1.62-mm-) thick, galvanized, sheet steel.
 - 3. Blade Axles: Galvanized steel.
 - 4. Tie Bars and Brackets: Galvanized steel.
- C. Jackshaft: 1-inch- (25-mm-) diameter, galvanized steel pipe rotating within a pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
 - 1. Length and Number of Mountings: Appropriate to connect linkage of each damper of a multiple-damper assembly.
- D. Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32-inch- (2.4-mm-) thick zinc-plated steel, and a 3/4-inch (19-mm) hexagon locking nut. Include center hole to suit damper operating-rod size. Include elevated platform for insulated duct mounting.

2.4 FIRE DAMPERS

- A. General: Labeled to UL 555.
- B. Fire Rating: One and one-half hours.
- C. Fire Rating: One and one-half hours.
- D. Frame: SMACNA Type B with blades out of airstream; fabricated with roll-formed, 0.034-inch- (0.85-mm-) thick galvanized steel; with mitered and interlocking corners.
- E. Mounting Sleeve: Factory- or field-installed galvanized, sheet steel.
 - 1. Minimum Thickness: 0.052 inch (1.3 mm) or 0.138 inch (3.5 mm) thick as indicated, and length to suit application.
 - 2. Exceptions: Omit sleeve where damper frame width permits direct attachment of perimeter mounting angles on each side of wall or floor, and thickness of damper frame complies with sleeve requirements.
- F. Mounting Orientation: Vertical or horizontal as indicated.
- G. Blades: Roll-formed, interlocking, 0.034-inch- (0.85-mm-) thick, galvanized, sheet steel. In place of interlocking blades, use full-length, 0.034-inch- (0.85-mm-) thick, galvanized steel blade connectors.
- H. Horizontal Dampers: Include a blade lock and stainless-steel negator closure spring.
- I. Fusible Link: Replaceable, 165 deg F (74 deg C) rated as indicated.

2.5 TURNING VANES

- A. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- B. Acoustic Turning Vanes: Fabricate of airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

2.6 DUCT-MOUNTED ACCESS DOORS AND PANELS

- A. General: Fabricate doors and panels airtight and suitable for duct pressure class.
- B. Frame: Galvanized, sheet steel, with bend-over tabs and foam gaskets.
- C. Door: Double-wall, galvanized, sheet metal construction with insulation fill and thickness, and number of hinges and locks as indicated for duct pressure class. Include vision panel where indicated. Include 1-by-1-inch (25-by-25-mm) butt or piano hinge and cam latches.
- D. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.
- E. Insulation: 1-inch- (25-mm-) thick, fibrous-glass or polystyrene-foam board.

2.7 FLEXIBLE CONNECTORS

- A. General: Flame-retarded or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.
- B. Standard Metal-Edged Connectors: Factory fabricated with a strip of fabric 3-1/2 inches (89 mm) wide attached to two strips of 2-3/4-inch- (70-mm-) wide, 0.028-inch- (0.7-mm-) thick, galvanized, sheet steel or 0.032-inch

- (0.8-mm) aluminum sheets. Select metal compatible with connected ducts.
- C. Extra-Wide Metal-Edged Connectors: Factory fabricated with a strip of fabric 5-3/4 inches (146 mm) wide attached to two strips of 2-3/4-inch- (70-mm-) wide, 0.028-inch- (0.7-mm-) thick, galvanized, sheet steel or 0.032-inch (0.8-mm) aluminum sheets. Select metal compatible with connected ducts.
- D. Transverse Metal-Edged Connectors: Factory fabricated with a strip of fabric 3-1/2 inches (89 mm) wide attached to two strips of 4-3/8-inch- (111-mm-) wide, 0.028-inch- (0.7-mm-) thick, galvanized, sheet steel or 0.032-inch (0.8-mm) aluminum sheets. Select metal compatible with connected ducts.
- E. Conventional, Indoor System Flexible Connector Fabric: Glass fabric double coated with polychloroprene.
 - 1. Minimum Weight: 26 oz./sq. yd. (880 g/sq. m).
 - 2. Tensile Strength: 480 lbf/inch (84 N/mm) in the warp, and 360 lbf/inch (63 N/mm) in the filling.
- F. Conventional, Outdoor System Flexible Connector Fabric: Glass fabric double coated with a synthetic-rubber, weatherproof coating resistant to the sun's ultraviolet rays and ozone environment.
 - 1. Minimum Weight: 26 oz./sq. yd. (880 g/sq. m).
 - 2. Tensile Strength: 530 lbf/inch (93 N/mm) in the warp, and 440 lbf/inch (77 N/mm) in the filling.

2.8 FLEXIBLE DUCTS

- A. General: Comply with UL 181, Class 1.
- B. Flexible Ducts, Insulated: Factory-fabricated, insulated, round duct, with an outer jacket enclosing 1-1/2-inch- (38-mm-) thick, glass-fiber insulation around a continuous inner liner.
 - 1. Reinforcement: Steel-wire helix encapsulated in inner liner.
 - 2. Outer Jacket: Polyethylene film.
 - 3. Inner Liner: Polyethylene film.
- C. Pressure Rating: 6-inch wg (1500 Pa) positive, 1/2-inch wg (125 Pa) negative.

2.9 ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments, and length to suit duct insulation thickness.
- B. Splitter Damper Accessories: Zinc-plated damper blade bracket; 1/4-inch (6-mm), zinc-plated operating rod; and a duct-mounted, ball-joint bracket with flat rubber gasket and square-head set screw.
- C. Flexible Duct Clamps: Stainless-steel band with cadmium-plated hex screw to tighten

band with a worm-gear action, in sizes 3 to 18 inches (75 to 450 mm) to suit duct size.

- D. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install duct accessories according to applicable details shown in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts and NAIMA's "Fibrous Glass Duct Construction Standards" for fibrous-glass ducts.
- B. Install volume dampers in lined duct; avoid damage to and erosion of duct liner.
- C. Provide test holes at fan inlet and outlet and elsewhere as indicated.
- D. Install fire and smoke dampers according to manufacturer's UL-approved written instructions.

- 1. Install fusible links in fire dampers.
- E. Install duct access panels for access to both sides of duct coils. Install duct access panels downstream from volume dampers, fire dampers, turning vanes, and equipment.
 - 1. Install duct access panels to allow access to interior of ducts for cleaning, inspecting, adjusting, and maintaining accessories and terminal units.
 - 2. Install access panels on side of duct where adequate clearance is available.
- F. Label access doors according to Division "Mechanical Identification."

3.2 ADJUSTING

- A. Adjust duct accessories for proper settings.
- B. Adjust fire dampers for proper action.
- C. Final positioning of manual-volume dampers is specified in Section "Testing, Adjusting, and Balancing."

END OF SECTION

**SECTION 23 31 13
METAL DUCTS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions.

1.2 SUMMARY

- B. This Section includes rectangular, round, and flat-oval metal ducts and plenums for heating, ventilating, and air-conditioning systems in pressure classes from minus 2- to plus 10-inch wg

1.3 DEFINITIONS

- A. Thermal Conductivity and Apparent Thermal Conductivity (k-Value): As defined in ASTM C 168. In this Section, these values are the result of the formula Btu x in./h x sq. ft. x deg F or W/m x K at the temperature differences specified. Values are expressed as Btu or W.

1.4 SYSTEM DESCRIPTION

- A. Duct system design, as indicated, has been used to select and size air-moving and -distribution equipment and other components of air system. Changes to layout or configuration of duct system must be specifically approved in writing by Architect.

1.5 SUBMITTALS

- A. Product Data: For duct liner and sealing materials.
- B. Shop Drawings: Show details of the following:
 - 1. **Duct layout indicating pressure classifications and sizes on plans.**
 - 2. **Fittings.**
 - 3. **Penetrations through fire-rated and other partitions.**
 - 4. **Coordination with other trades and including but not limited to: structural members, electrical lights and conduits, plumbing lines, & fire sprinkler lines.**
- C. Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items. Show the following:
 - 1. Ceiling- and wall-mounted access doors and panels required to provide access to dampers and other operating devices.
 - 2. Coordination with ceiling-mounted items, including lighting fixtures, diffusers, grilles, speakers, sprinkler heads, access panels, and special moldings.
- D. Duct Construction Standards: Provide a copy of the duct construction standards to be used for each pressure classification in this project. Duct Construction Standards must comply with the latest edition of

SMACNA "HVAC Duct Construction Standards – Metal and Flexible."

- E. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
- F. Record Drawings: Indicate actual routing, fitting details, reinforcement, support, and installed accessories and devices.

1.6 QUALITY ASSURANCE

- A. Welding Standards: Qualify welding procedures and welding personnel to perform welding processes for this Project according to AWS D1.1, "Structural Welding Code--Steel," for hangers and supports; AWS D1.2, "Structural Welding Code--Aluminum," for aluminum supporting members; and AWS D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
- B. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," unless otherwise indicated.
- C. Comply with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems," unless otherwise indicated.
- D. Comply with NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations," Chapter 3, "Duct System," for range hood ducts, unless otherwise indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sealant and firestopping materials to site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle sealant and firestopping materials according to manufacturer's written recommendations.
- C. Deliver and store stainless-steel sheets with mill-applied adhesive protective paper maintained through fabrication and installation
- D. Deliver and store all ductwork with protective material until installation. Any material left exposed to moisture and/or particulates shall be removed and replaced.
- E. Any installed ductwork or piping system left temporarily incomplete shall be covered with protective material until final connections can be installed.
- F. All ductwork and/or liner insulation to be wrapped with protective material until installation. Any ductwork or insulation left exposed to the environment or

contaminating particulate matter shall be replaced at the contractor's expense.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

- A. Galvanized, Sheet Steel: Lock-forming quality; ASTM A 653/A 653M, G90 (Z275) coating designation; mill-phosphatized finish for surfaces of ducts exposed to view.
- B. Carbon-Steel Sheets: ASTM A 366/A 366M, cold-rolled sheets; commercial quality; with oiled, exposed matte finish.
- C. Stainless Steel: ASTM A 480/A 480M, Type 316, sheet form with No. 4 finish for surfaces of ducts exposed to view; and Type 304, sheet form with No. 1 finish for concealed ducts.
- D. Reinforcement Shapes and Plates: Galvanized steel reinforcement where installed on galvanized, sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- E. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for 36-inch (900-mm) length or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.2 SEALANT MATERIALS

- A. Joint and Seam Sealants, General: The term "sealant" is not limited to materials of adhesive or mastic nature but includes tapes and combinations of open-weave fabric strips and mastics.
 - 1. Joint and Seam Sealant: One-part, nonsag, solvent-release-curing, polymerized butyl sealant, formulated with a minimum of 75 percent solids.
 - 2. Flanged Joint Mastics: One-part, acid-curing, silicone, elastomeric joint sealants, complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.

2.3 HANGERS AND SUPPORTS

- A. Hanger Materials: Galvanized, sheet steel or round, threaded steel rod.
 - 1. Hangers Installed in Corrosive Atmospheres: Electrogalvanized, all-thread rod or galvanized rods with threads painted after installation.
 - 2. Straps and Rod Sizes: Comply with latest edition of SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for sheet steel width and thickness and for steel rod diameters.
- B. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- C. Trapeze and Riser Supports: Steel shapes complying with ASTM A 36/A 36M.
 - 1. Supports for Galvanized-Steel Ducts: Galvanized steel shapes and plates.
 - 2. Supports for Stainless-Steel Ducts: Stainless-steel support materials.

- 3. Supports for Aluminum Ducts: Aluminum support materials, unless materials are electrolytically separated from ductwork.

2.4 RECTANGULAR DUCT FABRICATION

- A. General: Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction with galvanized, sheet steel, according to the latest edition of SMACNA's "HVAC Duct Construction Standards--Metal and Flexible." Comply with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.
 - 1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure classification.
 - 2. Materials: Free from visual imperfections such as pitting, seam marks, roller marks, stains, and discolorations.
- B. Fabricate range hood exhaust ducts with 0.0598-inch- thick, galvanized sheet for concealed ducts and 0.0500-inch- thick stainless steel for exposed ducts. Weld and flange seams and joints. Comply with NFPA 96.
- C. Fabricate dishwasher hood exhaust ducts with 0.0500-inch- thick stainless steel. Weld and flange seams and joints.
- D. Static-Pressure Classifications: Unless otherwise indicated, construct ducts to the following:
 - 1. Supply Ducts between AHU and Air Terminal Units: 3-inch wg.
 - 2. Supply Ducts after air terminal units and on constant volume supply equipment: 1-inch wg (250 Pa), positive pressure
 - 3. Return Ducts: 1-inch wg ,negative pressure.
 - 4. Exhaust Ducts: 1-inch wg negative pressure.
- E. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches and larger and 0.0359 inch thick or less, with more than 10 sq. ft. of unbraced panel area, unless ducts are lined.

2.5 ROUND FABRICATION

- A. Round Ducts: Fabricate spiral seam supply and return ducts of galvanized steel according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible." Snap Lock Longitudinal seam ductwork will not be allowed. Adjustable elbows will not be allowed.
- B. Spiral seam round or oval duct may be substituted for rectangular duct at the contractors option. Spiral seam ductwork sizing must result in the same or less pressure drop than the rectangular duct indicated on the plans.

2.6 DUCT STORAGE

- A. All duct must have end capped with plastic covers on both ends from end of fabrication to duct installation. If this is not provided at the field, vacuum ducts before final acceptance to remove dust and debris.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION, GENERAL

- A. Duct installation requirements are specified in other Division Sections. Drawings indicate general arrangement of ducts, fittings, and accessories.
- B. Construct and install each duct system for the specific duct pressure classification indicated.
- C. Install round ducts in lengths not less than 10 feet (3 m), unless interrupted by fittings.
- D. Install ducts with fewest possible joints.
- E. Install fabricated fittings for changes in directions, changes in size and shape, and connections.
- F. Install couplings tight to duct wall surface with a minimum of projections into duct.
- G. Install ducts, unless otherwise indicated, vertically and horizontally, parallel and perpendicular to building lines; avoid diagonal runs.
- H. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- I. Install ducts with a clearance of 1 inch (25 mm), plus allowance for insulation thickness.
- J. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions, unless specifically indicated.
- K. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.
- L. Electrical Equipment Spaces: Route ductwork to avoid passing through transformer vaults and electrical equipment spaces and enclosures.
- M. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same metal thickness as duct. Overlap opening on four sides by at least 1-1/2 inches (38 mm).
- N. Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire damper, sleeve, and firestopping sealant. Fire and smoke dampers are specified in Division Section "Duct Accessories." Firestopping materials and installation methods are specified in other Divisions

3.2 SEAM AND JOINT SEALING

- A. General: Seal duct seams and joints according to the duct pressure class

indicated and as described in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible." All duct to be sealed to SMACNA seal class A which requires sealing all transverse joints, longitudinal seams and duct wall penetrations regardless of pressure classification.

- B. Seal externally insulated ducts before insulation installation.
- C. All ducts shall be inspected after sealing is complete and prior to insulation installation. Provide the engineer with a minimum 7 days notice prior to beginning duct insulation.

3.3 RANGE HOOD EXHAUST DUCT INSTALLATIONS

- A. Install ducts to allow for thermal expansion of ductwork through 2000 deg F temperature range.
- B. Install ducts without dips or traps that may collect residues, unless traps have continuous or automatic residue removal.
- C. Install access openings at each change in direction and at 15-foot intervals; locate on sides of duct a minimum of 1-1/2 inches from bottom; and fit with grease-tight covers of same material as duct.
- D. Do not penetrate fire-rated assemblies.

3.4 DISHWASHER EXHAUST DUCT INSTALLATIONS

- A. Install dishwasher exhaust ducts according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

3.5 HANGING AND SUPPORTING

- A. Install rigid round and rectangular metal duct with support systems indicated in the latest edition of SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- B. Support horizontal ducts within 24 inches of each elbow and within 48 inches of each branch intersection.
- C. Support vertical ducts at a maximum interval of 16 feet and at each floor.
- D. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.

3.6 CONNECTIONS

- A. Connect equipment with flexible connectors according to Section "Duct Accessories."
- B. For branch, outlet and inlet, and terminal unit connections, comply with the latest edition of SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

3.7 DUCT APPLICATION

- A. Service: Round and rectangular, supply/return/outside -air ducts, concealed.
- B. Sheet-metal with wrap insulation
- C. Service: Round and rectangular, supply/return/outside -air ducts, exposed and in mechanical rooms.
 - 1. Sheet-metal double wall with lined insulation in-between.

2. Inner sheet-metal duct shall be perforated in areas with acoustical requirements, ref. plans.

3.8 FIELD QUALITY CONTROL

- A. Disassemble, reassemble, and seal segments of systems as required to accommodate leakage testing and as required for compliance with test requirements.
- B. **25% of the duct installed after the air handling units and (prior to the air terminal units, when applicable) shall be tested in the presence of the Architect, at static pressures equal to maximum design pressure of system or section being tested. The sections of duct to be tested shall be chosen by the architect or engineer after installation of the duct. If pressure classifications are not indicated, test entire system at maximum system design pressure. Do not pressurize systems above**

maximum design operating pressure. Give seven days' advance notice for testing.

- C. Leakage Test: Perform tests according to SMACNA's "HVAC Air Duct Leakage Test Manual."
- D. Maximum Allowable Leakage: Comply with requirements for Leakage Classification 3 for round, Leakage Classification 12 for rectangular ducts in pressure classifications less than and equal to 2-inch wg (both positive and negative pressures), and Leakage Classification 6 for pressure classifications from 2- to 10-inch wg.
- E. Remake leaking joints and retest until leakage is less than maximum allowable.

3.9 CLEANING

- A. After completing system installation, including outlet fittings and devices, inspect the system.

END OF SECTION

**SECTION 23 34 23
CENTRIFUGAL FANS**

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes centrifugal fans and vent sets.

1.2 PERFORMANCE REQUIREMENTS

- A. Project Altitude: Base air ratings on actual site elevations.
- B. Operating Limits: Classify according to AMCA standards.

1.3 SUBMITTALS

- A. Product Data: Include rated capacities, furnished specialties, and accessories for each unit scheduled and include the following:
 - 1. Certified fan performance curves with system operating conditions indicated.
 - 2. Certified fan sound-power ratings.
 - 3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
 - 4. Material gages and finishes, including color charts.
 - 5. Dampers, including housings, linkages, and operators.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1. Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
- C. Maintenance Data: For centrifugal fans to include in maintenance manuals specified in specifications.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. AMCA Compliance: Products shall comply with performance requirements and shall be licensed to use the AMCA-Certified Ratings Seal.
- C. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver fans as factory-assembled units, to the extent allowable by shipping limitations, with protective crating and covering.
- B. Disassemble and reassemble units, as required for moving to the final location, according to manufacturer's written instructions.

- C. Lift and support units with manufacturer's designated lifting or supporting points.

1.6 COORDINATION

- A. Coordinate size and location of structural support members and/or shaft locations.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in these documents.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Belts: One set for each belt-driven unit.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cook, Loren Company.
 - 2. Greenheck.

2.2 HOUSINGS

- A. Roof Mounted Centrifugal Exhaust Fan.
 - 1. The fan shall be of bolted and welded construction utilizing corrosion resistant fasteners. The spun aluminum structural components shall be constructed of minimum 16 gauge marine alloy aluminum, bolted to a rigid aluminum support structure. The aluminum base shall have continuously welded curb cap corners for maximum leak protection. The discharge baffle shall have a rolled bead for added strength. An integral conduit chase shall be provided through the curb cap and into the motor compartment to facilitate wiring connections. Bearings and drives shall be mounted on a minimum 14 gauge steel power assembly, isolated from the unit structure with rubber vibration isolators. These components shall be enclosed in a weather-tight compartment, separated from the exhaust airstream. Unit shall bear an engraved aluminum nameplate and shall be shipped in ISTA certified transit tested packaging.

2.3 WHEELS

- A. Roof Mounted Centrifugal Exhaust Fan
 - 1. Wheel shall be centrifugal backward inclined, constructed of 100% aluminum, including a precision machined cast aluminum hub. Wheel inlet shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Wheel shall be balanced in

accordance with AMCA Standard 204-96, Balance Quality and Vibration Levels for Fans.

2.4 SHAFTS

- A. Statically and dynamically balanced and selected for continuous operation at maximum rated fan speed and motor horsepower, with final alignment and belt adjustment made after installation.
- B. Turned, ground, and polished hot-rolled steel with keyway. Ship with a protective coating of lubricating oil.
- C. Designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.

2.5 BEARINGS

- A. Prelubricated and Sealed Shaft Bearings: Self-aligning, pillow-block-type ball bearings.
 - 1. Ball-Bearing Rating Life: ABMA 9, L_{50} of 200,000 hours.
 - 2. Roller-Bearing Rating Life: ABMA 11, L_{50} of 200,000 hours.

2.6 BELT DRIVES

- A. Description: Factory mounted, with final alignment and belt adjustment made after installation.
 - 1. Service Factor Based on Fan Motor: 1.5.
- B. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
- C. Motor Pulleys: Adjustable pitch for use with motors through 5 hp; fixed pitch for use with motors larger than 5 hp. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
- D. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
- E. Motor Mount: Adjustable for belt tensioning.

2.7 ACCESSORIES

- A. Scroll Access Doors: Shaped to conform to scroll, with quick-opening latches and gaskets.
- B. Companion Flanges: Galvanized steel, for duct connections.
- C. Scroll Drain Connection: NPS 1 (DN 25) steel pipe coupling welded to low point of fan scroll.
- D. Shaft Cooler: Metal disk between bearings and fan wheel, designed to dissipate heat from shaft.
- E. Spark-Resistant Construction: AMCA 99 (where required).
- F. Shaft Seals: Airtight seals installed around shaft on drive side of single-width fans.
- G. Weather Cover: Enameled-steel sheet with ventilation slots, bolted to housing.

2.8 MOTORS

- A. Refer to Section "Motors" for general requirements for factory-installed motors.

- B. Motor Construction: NEMA MG 1, general purpose, continuous duty, high efficiency, Design B.
- C. Enclosure Type: [Open dripproof] [Totally enclosed, fan cooled].

2.9 SOURCE QUALITY CONTROL

- A. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.
- B. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install centrifugal fans level and plumb.
- B. Install units with clearances for service and maintenance.
- C. Label fans according to requirements specified in Section "Mechanical Identification."

3.2 CONNECTIONS

- A. Duct installation and connection requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Division 23 Section "Duct Accessories."
- B. Install ducts adjacent to fans to allow service and maintenance.
- C. Ground equipment.
- D. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 FIELD QUALITY CONTROL

- A. Equipment Startup Checks:
 - 1. Verify that shipping, blocking, and bracing are removed.
 - 2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
 - 3. Verify that cleaning and adjusting are complete.
 - 4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive

system, align and adjust belts, and install belt guards.

5. Verify lubrication for bearings and other moving parts.

B. Starting Procedures:

1. Energize motor and adjust fan to indicated rpm.
2. Measure and record motor voltage and amperage.

- C. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new units, and retest.

- D. Test and adjust controls and safeties.

Replace damaged and malfunctioning controls and equipment.

- E. Shut unit down and reconnect automatic temperature-control operators.

- F. Refer to Section "Testing, Adjusting, and Balancing" for testing, adjusting, and balancing procedures.

- G. Replace fan and motor pulleys as required to achieve design airflow.

- H. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.

3.4 ADJUSTING

- A. Adjust damper linkages for proper damper operation.

- B. Adjust belt tension.

- C. Lubricate bearings.

3.5 CLEANING

- A. On completion of installation, internally clean fans according to manufacturer's written instructions. Remove foreign material and construction debris. Vacuum fan wheel and cabinet.

- B. After completing system installation, including outlet fitting and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain centrifugal fans.

1. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.

2. Review data in maintenance manuals. Refer to specifications Section "Closeout Procedures."

3. Schedule training with Owner, through Architect, with at least seven days' advance notice.

END OF SECTION

DIVISION 26

ELECTRICAL

THE AGREEMENT, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, SUPPLEMENTARY CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, AND ALL ADDENDA ARE A PART OF THE CONTRACT. THE CONTRACTOR SHALL CONSULT THEM IN DETAIL FOR INSTRUCTIONS PERTAINING TO THE WORK. THE CONTRACTOR SHALL ALSO CONSULT ALL OTHER DIVISIONS AND SECTIONS OF THE PROJECT MANUAL, AND ALL DRAWINGS IN THE EXECUTION OF THE WORK OF THE CONTRACT.

THE CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, SYSTEMS, EQUIPMENT, ITEMS, ARTICLES, OPERATIONS, AND/OR METHODS LISTED, IMPLIED, MENTIONED, OR SCHEDULED IN THE CONTRACT DOCUMENTS AND/OR NECESSARY AND/OR REQUIRED FOR THE SATISFACTORY COMPLETION OF THE WORK.

THE LISTING OF WORK, REQUIREMENTS, AND PRODUCTS IN THIS SECTION IS NOT INTENDED TO BE CONCLUSIVE. THE CONTRACTOR SHALL CHECK ALL OTHER PARTS OF THE CONTRACT DOCUMENTS AND SHALL PROVIDE ALL MISCELLANEOUS ITEMS OF WORK AND PRODUCTS NECESSARY FOR THE SATISFACTORY COMPLETION OF THE WORK DESCRIBED IN THE CONTRACT DOCUMENTS.

SECTION 26 01 00
SUMMARY OF ELECTRICAL WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. The following Summary of Work is intended as an aid to achieve an understanding of the various elements of work included in the project, as is not intended to be all-inclusive. Detailed descriptions of work and requirements are given in drawings and specifications.
- B. General Scope of Work:
 - 1. Providing new panels, feeders, conduits, disconnect, fire alarm, rough-in for telephone and data system, and new light fixtures.

1.4 COORDINATION

- A. All electrical work shall be done under sub-contract to a General Contractor. Electrical Contractor shall coordinate all work through General Contractor, even in areas where only electrical work is to take place.
- B. Work shall take place with minimal disruption to Owner's operations in areas surrounding the new building.
- C. Cooperate fully with other contractors so that work under those contracts may be carried out smoothly, without interfering with or delaying work under this Contract.
- D. Fully coordinate with mechanical contractor for providing power to mechanical equipment.

1.5 UTILITIES

- 1. Coordinate with power company and provide conduit, and trenching from transformer to power source. Coordinate with water, telephone, cable and gas utilities to locate all utilities prior to digging in any area.

- 2. Obtain any approvals required from utilities to relocate utilities.
- 3. Cost of relocating or bypassing utilities indicated on drawings shall be included in Base Bid.

1.6 CONTRACTOR USE OF PREMISES

- A. Use of the Site: Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.
 - 1. Driveways and Entrances: Keep driveways and entrances serving the premises, clear and available to the Owner, the Owner's employees, and emergency vehicles at all time. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- B. Site Safety: Take every precaution to ensure the site does not present a threat to the safety of occupants and/or workers. Minimal safety requirements include, but are not limited to the following:
 - 1. Temporary fencing around construction areas.
 - 2. Yellow caution tape and construction barricades along open trenches during the day. Trenches shall be covered at night and warning lights provided on construction barricades.
 - 3. Temporary fencing around equipment while site work is in progress.

1.7 SUBMITTALS

- 1. To expedite the submittal process more efficiently, do not piece-meal the submittals. Submit entire electrical in a bound enclosure. This will eliminate delays in the submittal process. Unbound submittals shall be returned without review. Submit 10 copies minimum.

END OF SECTION

SECTION 26 01 10
BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Raceways.
 - 2. Building wire and connectors.
 - 3. Supporting devices for electrical components.
 - 4. Electrical identification.
 - 5. Electricity-metering components.
 - 6. Concrete equipment bases.
 - 7. Electrical demolition.
 - 8. Cutting and patching for electrical construction.
 - 9. Touchup painting.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. FMC: Flexible metal conduit.
- C. IMC: Intermediate metal conduit.
- D. LFMC: Liquidtight flexible metal conduit.
- E. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

- A. Product Data: For electricity-metering equipment.
- B. Shop Drawings: Dimensioned plans and sections or elevation layouts of electricity-metering equipment.
- C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

1.6 COORDINATION

- A. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.
 - 1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.
- B. Sequence, coordinate, and integrate minimum.
- 3.

installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.

- C. Coordinate electrical service connections to components furnished by utility companies.
 - 1. Coordinate installation and connection of exterior underground and overhead utilities and services, including provision for electricity-metering components.
 - 2. Comply with requirements of authorities having jurisdiction and of utility company providing electrical power and other services.
- D. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces. Access doors and panels are specified in Section "Access Doors."
- E. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.
- F. Where electrical identification markings and devices will be concealed by acoustical ceilings and similar finishes, coordinate installation of these items before ceiling installation.

PART 2 - PRODUCTS

2.1 EQUIPMENT FOR UTILITY COMPANY'S ELECTRICITY METERING

- A. Current-Transformer Cabinets: Comply with requirements of electrical power utility company.
- B. Meter Sockets: Comply with requirements of electrical power utility company.
- C. Modular Meter Centers: Factory-coordinated assembly of a main meter center circuit-breaker unit with wireways, tenant meter socket modules, and tenant branch circuit breakers arranged in adjacent vertical sections, complete with interconnecting buses.
 - 1. Housing: NEMA 250, Type 3R enclosure.
 - 2. Tenant Branch Circuit Breakers: Series combination rated to protect circuit breakers in downstream panelboards that have 10,000-A interrupting capacity,

2.2 CONCRETE BASES

- A. Concrete Forms and Reinforcement Materials: As specified in Section "Cast-in-Place Concrete."
- B. Concrete: 3000-psi (20.7-MPa), 28-day compressive strength as specified in Section "Cast-in-Place Concrete."

2.3 TOUCHUP PAINT

- A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.
- B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

PART 3 - EXECUTION

3.1 ELECTRICAL EQUIPMENT INSTALLATION

- A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.
- B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.
- C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.
- D. Right of Way: Give to raceways and piping systems installed at a required slope.

3.2 RACEWAY AND CABLE INSTALLATION

- A. Conceal raceways and cables, unless otherwise indicated, within finished walls, ceilings, and floors.
- B. Install raceways and cables at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Locate horizontal raceway runs above water and steam piping.
- C. Use temporary raceway caps to prevent foreign matter from entering.
- D. Make conduit bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.
- E. Use raceway and cable fittings compatible with raceways and cables and suitable for use and location.
- F. Install raceways embedded in slabs in middle third of slab thickness where practical, and leave at least 1-inch (25-mm) concrete cover.
 - 1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
 - 2. Space raceways laterally to prevent voids in concrete.
 - 3. Install conduit larger than 1-inch trade size (DN27) parallel to or at right angles to main reinforcement. Where conduit is at right angles to rein-

forcement, place conduit close to slab support.

- 4. Transition from nonmetallic tubing to Schedule 80 nonmetallic conduit, rigid steel conduit, or IMC before rising above floor.
- 5. Make bends in exposed parallel or banked runs from same centerline to make bends parallel. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for exposed parallel raceways.
- G. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of the pull wire.
- H. Install telephone and signal system raceways, 2-inch trade size (DN53) and smaller, in maximum lengths of 150 feet (45 m) and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements, in addition to requirements above.
- I. Connect motors and equipment subject to vibration, noise transmission, or movement with a maximum of 72-inch (1830-mm) flexible conduit. Install LPMC in wet or damp locations. Install separate ground conductor across flexible connections.
- J. Set floor boxes level and trim after installation to fit flush to finished floor surface.

3.3 ELECTRICAL SUPPORTING DEVICE APPLICATION

- A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, U-channel system components.
- B. Dry Locations: Steel materials.
- C. Support Clamps for PVC Raceways: Click-type clamp system.
- D. Selection of Supports: Comply with manufacturer's written instructions.
- E. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 200-lb (90-kg) design load.

3.4 SUPPORT INSTALLATION

- A. Install support devices to securely and permanently fasten and support electrical components.
- B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.
- C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hang-

- ers.
- D. Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.
 - E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.
 - F. Install 1/4-inch- (6-mm-) diameter or larger threaded steel hanger rods, unless otherwise indicated.
 - G. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 1-1/2-inch (38-mm) and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings and for fastening raceways to slotted channel and angle supports.
 - H. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.
 - I. Simultaneously install vertical conductor supports with conductors.
 - J. Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet-metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches (610 mm) from the box.
 - K. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.
 - L. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.
 - M. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:
 1. Wood: Fasten with wood screws or screw-type nails.
 2. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.
 3. New Concrete: Concrete inserts with machine screws and bolts.
 4. Existing Concrete: Expansion bolts.
 5. Instead of expansion bolts, threaded

studs driven by a powder charge and provided with lock washers may be used in existing concrete.

6. Steel: Welded threaded studs or spring-tension clamps on steel.
 - a. Field Welding: Comply with AWS D1.1.
7. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.
8. Light Steel: Sheet-metal screws.
9. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

3.5 IDENTIFICATION MATERIALS AND DEVICES

- A. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout Project.
- C. Self-Adhesive Identification Products: Clean surfaces before applying.
- D. Identify raceways and cables with color banding as follows:
 1. Bands: Pretensioned, snap-around, colored plastic sleeves or colored adhesive marking tape. Make each color band 2 inches (51 mm) wide, completely encircling conduit, and place adjacent bands of two-color markings in contact, side by side.
 2. Band Locations: At changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (8-m) maximum intervals in congested areas.
 3. Colors: As follows:
 - a. Fire Alarm System: Red.
 - b. Security System: Blue and yellow.
 - c. Telecommunication System: Green and yellow.
- E. Tag and label circuits designated to be extended in the future. Identify source and circuit numbers in each cabinet, pull and junction box, and outlet box. Color-coding may be used for voltage and phase identification.
- F. Install continuous underground plastic markers during trench backfilling, for exterior underground power, control, signal, and communication lines located directly above power and communication lines. Locate 6 to 8 inches (150 to 200 mm) below finished grade. If width of multiple lines installed in a common trench or concrete envelope does

not exceed 16 inches (400 mm), overall, use a single line marker.

- G. Color-code 208/120-V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:

1. Phase A: Black.
2. Phase B: Red.
3. Phase C: Blue.
4. Neutral: White.
5. Ground: Green.

- H. Color-code 480/277-V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:

1. Phase A: BROWN.
2. Phase B: ORANGE.
3. Phase C: YELLOW.
4. Neutral: White with a colored stripe or gray.
5. Ground: Green.

- I. Install warning, caution, and instruction signs where required to comply with 29 CFR, Chapter XVII, Part 1910.145, and where needed to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.

- J. Install engraved-laminated emergency-operating signs with white letters on red background with minimum 3/8-inch- (9-mm-) high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.

3.6 UTILITY COMPANY ELECTRICITY-METERING EQUIPMENT

- A. Install equipment according to utility company's written requirements. Provide grounding and empty conduits as required by utility company.

3.7 FIRESTOPPING

- A. Apply firestopping to cable and raceway penetrations of fire-rated floor and wall assemblies to achieve fire-resistance rating of the assembly. Firestopping materials and installation requirements are specified in Section "Firestopping."

3.8 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger, in both directions, than supported unit. Follow supported equipment manufacturer's anchorage recommendations and setting templates for anchor-bolt and tie locations, unless otherwise indicated. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete and reinforcement as

specified in Section "Cast-in-Place Concrete."

3.9 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.

- B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

3.10 FIELD QUALITY CONTROL

- A. Inspect installed components for damage and faulty work, including the following:

1. Raceways.
2. Building wire and connectors.
3. Supporting devices for electrical components.
4. Electrical identification.
5. Electricity-metering components.
6. Concrete bases.
7. Electrical demolition.
8. Cutting and patching for electrical construction.
9. Touchup painting.

- B. Test Owner's electricity-metering installation for proper operation, accuracy, and usability of output data.

1. Connect a load of known kW rating, 1.5 kW minimum, to a circuit supplied by the metered feeder.
2. Turn off circuits supplied by the metered feeder and secure them in the "off" condition.
3. Run the test load continuously for eight hours, minimum, or longer to obtain a measurable meter indication. Use a test load placement and setting that ensure continuous, safe operation.
4. Check and record meter reading at end of test period and compare with actual electricity used based on test load rating, duration of test, and sample measurements of supply voltage at the test load connection. Record test results.
5. Repair or replace malfunctioning metering equipment or correct test setup; then retest. Repeat for each meter in installation until proper operation of entire system is verified.

3.11 REFINISHING AND TOUCHUP PAINTING

- A. Refinish and touch up paint. Paint materials and application requirements are specified in Section "Painting."

1. Clean damaged and disturbed areas

- and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
 3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 4. Repair damage to PVC or paint finishes with matching touchup coating

recommended by manufacturer.

3.12**CLEANING AND PROTECTION**

- A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.
- B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 26 01 20
BASIC ELECTRICAL REQUIREMENTS

PART1- GENERAL

1.1 RELATED REQUIREMENTS

- A. The General Provisions, Supplemental General Provisions, Special Provisions, Specification Sections and all relevant documents shall form a part of this Section of the Specifications, and shall be incorporated in this Section and each Section 260000 hereinafter as if repeated verbatim herein. All conditions imposed by these documents shall be applicable to all portions of the work under this Section. Certain specific paragraphs of said references may be referred to hereinafter in this Section. These references are intended to point out specific items to the Contractor, but in no way relieve him of the responsibility of reading and complying with all relevant parts of the entire Specification.
- B. The Contractor shall examine and coordinate with all Contract Drawings and Specifications, and all Addenda issued. Failure to comply shall not relieve him of responsibility. The omission of details of other portions of the work from this Section shall not be used as a basis for a request for additional compensation.
- C. The specific features and details for other portions of the work related to the construction in progress or to the adjacent building shall be determined by examination at the site.

1.2 SCOPE OF WORK

- A. The requirements contained in this Section apply to all work performed under these Specifications.
- B. The work covered by this Section of the Specifications comprises the furnishing of labor, material, equipment, transportation, tools and services, and performing operations required for, and reasonably incidental to, the installation of the work in accordance with the applicable Contract Documents, and subject to the terms and conditions of the Contract.
- C. Refer to other Sections of the Specifications for related work.

1.3 DEFINITION OF "CONTRACTOR"

- A. Where the word "Contractor" is used under any Section of this Section of the Specifications, it shall mean the Contractor engaged to execute the work included under that Section, even though this Contractor may be technically described as a Subcontractor, or an authorized representative.
- B. If the Contractor, engaged to execute a portion of the work, employs a Subcontractor to perform some of that work, he shall be completely responsible for the proper execution of this Subcontractor's work, in full conformity with the Contract Documents.

1.4 RESPONSIBILITY OF THE CONTRACTOR

- A. The Contractor shall be responsible for all work of every description in connection with this Section of the Specifications. The Contractor shall specifically and distinctly assume, and does so assume, all risk for damage or injury from whatever cause to property or person used or employed on or in connection with this work and of all damages or injury to any person or property wherever located, resulting from an action or operation under the Contract in connection with the work, and undertake the responsibility to defend the Owner against all claims on account of any such damage or injury.
- B. The Contractor will be held responsible for the satisfactory execution and completion of the work in accordance with the true intent of the Contract Documents. The Contractor shall provide without extra charge all incidental items required as part of the work, even though it may not be specifically indicated. If the Contractor has reason for objecting to the use of any material, equipment, device or method of construction as indicated, the Contractor shall make report of such objections to the Owner's Representative, obtain proper approval and adjustment to the Contract, and shall proceed with the work.

1.5 TERMINOLOGY

- A. Whenever the words "furnish", "provide", "furnish and install", "provide and install", and similar phrases occur, it is the intent that the materials, equipment and devices described be furnished, installed and connected under this Section, complete for operation, unless specifically noted to the contrary.
- B. It is also the intent, unless specifically noted to the contrary, that all materials, equipment and devices described and specified under this Section of the Specifications be similarly furnished, installed and connected under this Section, whether or not a phrase as described in the preceding paragraph has been actually included.
- C. Whenever the words "Owner's Representative" occurs, it is intended to refer to the Architect, Engineer and/or specific Owner's Representative responsible for or capable of providing the necessary direction pertaining to the referenced issue.

1.6 ORDINANCES, PERMITS AND CODES

- A. It shall be the Contractor's duty to perform the work and provide the materials covered by these specifications in conformance with all ordinances and regulations of all authorities having jurisdiction.

- B. All work herein shall conform to all applicable laws, ordinances and regulations of the local utility companies.
- C. The Contractor shall obtain and pay for all permit and connection fees as required for the complete installation of the specified systems, equipment, devices and materials.
- D. The Contractor shall obtain permits, plan checks, inspections and approvals applicable to the work as required by the regulatory authorities. Fees and costs of any nature whatsoever incidental to these permits, inspections and approvals shall be assumed and paid by the Contractor. The pro-rata costs, if any, for utilities serving this property will be paid for by the Owner and shall not be included as part of this Contract.
- E. The work shall be in accordance with, but shall not be limited to, the requirements of:
 - 1 National Fire Protection Association
 - 2 National Electrical Code
 - 3 National Safety Code
 - 4 State of Texas Safety Code
 - 5 Local City Building Codes
 - 6 State of Texas Building Codes
- F. Codes and standards referred to are minimum standards. Where the requirements of the Drawings or Specifications exceed those of the codes and regulations, the Drawings and Specifications govern.

1.7 MATERIALS, EQUIPMENT AND DEVICE DESCRIPTION

- A. Materials, equipment and devices shall be of the best quality customarily applied in quality commercial practice, and shall be the products of reputable manufacturers. Each major component shall bear a nameplate giving the name and address of the manufacturer, and the catalog number or designation of the component.
- B. Materials, equipment and devices furnished under this Section of the Specifications shall be essentially the standard product of the specified manufacturer, or where allowed, an alternate manufacturer. Where two or more units of the same kind or class of a specific item are required, these shall be the products of a single manufacturer; however, the component parts of the item need not be the products of one manufacturer.
- C. In describing the various materials, equipment and devices, in general each item will be described singularly, even though there may be a multiplicity of identical items. Also, where the description is only general in nature, exact sizes, duties, space arrangements, horsepower requirements and other data shall be determined by reference to the Contract Documents.
- D. Space allocations for materials, equipment and devices have been made on the basis of present and known future requirements and

the dimensions of items of equipment or devices of a particular manufacturer whether indicated or not. The Contractor shall verify that all materials, equipment and devices proposed for use on this project are within the constraints of the allocated space.

1.8 QUALITY ASSURANCE

- A. Materials, equipment and devices shall be new and of the quality specified, and shall be free from defects at the time of installation. Materials, equipment and devices damaged in shipment or otherwise damaged or found defective prior to acceptance by the Owner shall not be repaired at the job site, but shall be replaced with new materials, equipment or devices identical with those damaged, unless specifically approved otherwise by the Owner's Representative.
- B. Wherever a UL standard has been established for a particular type of material, equipment or device, each item of such material, equipment or device provided on this project shall meet the requirements of the UL standard in every way, and shall be UL listed and labeled.

1.9 REFERENCE STANDARDS

- A. Materials, equipment, devices and workmanship shall comply with applicable local, county, state and national codes, laws and ordinances, utility company regulations and industry standards.
- B. In case of differences between building codes, state laws, local ordinances, industry standards, utility company regulations and the Contract Documents, the most stringent shall govern. The Contractor shall promptly notify the Owner's Representative in writing of any such difference. Should the Contractor perform any work that does not comply with local codes, laws and ordinances, industry standards or other governing regulations, the work shall be corrected of noncompliance deficiencies with the Contractor bearing all costs.
- C. In addition to the aforementioned ordinances, industry standards published by the following organizations shall apply:

AABM	-	American Association of Battery Manufacturers
ADA	-	American's with Disabilities Act
AIA	-	American Institute of Architects
ANSI	-	American National Standards Institute
ASTM	-	American Society for Testing and Materials
CBM Association	-	Certified Ballast Manufacturers Association
ETL	-	Electrical Testing Laboratories
FM	-	Factory Mutual

ICEA	-	Insulated Cable Engineers Associated
IEEE	-	Institute of Electrical and Electronic Engineers
IES	-	Illuminating Engineering Society
IRI	-	Industrial Risk Insurance
NBS	-	National Bureau of Standards
NEC	-	National Electrical Code
NECA	-	National Electrical Contractors Association
NEMA	-	National Electrical Manufacturers Association
NESC	-	National Electrical Safety Code
NETA	-	National Electrical Testing Association
NFPA	-	National Fire Protection Association
UL	-	Underwriters Laboratories

1.10 DRAWINGS AND SPECIFICATIONS

- A. The interrelation of the Drawings (including the schedules) and the Specifications are as follows:
 - 1 The Drawings establish quantities, locations, dimensions and details of materials, equipment and devices. The schedules on the Drawings indicate the capacities, characteristics and components.
 - 2 The Specifications provide written requirements for the quality, standard and nature of the materials, equipment, devices and construction systems.
- B. The Drawings and Specifications shall be considered as being compatible; therefore, the work called for by one and not by the other shall be furnished and installed as though called for by both. Resolution of conflicts between Drawings and Specifications shall be as follows:
 - 1 If the Drawings and Specifications disagree in themselves, or with each other, the Contractor's pricing shall be based on furnishing and installing the most expensive combination of quality and quantity of work indicated for a complete operable system. Contractor is responsible to notifying the Architect and Engineer. In the event of this type of disagreement, the resolution shall be determined by the Owner's Representative. The contractor shall assume for an operable system at the most expensive combination as per the latest National Electrical Code. The contractor shall review all drawings and specifications prior to bid date.
 - 2 The Contractor shall be responsible for bringing any conflicts in the Drawings and the Specifications to the attention of the Owner's Representative immediately, prior to bid date.
 - 3 In general, if there is conflict between the

Drawings and Specifications, the Drawings shall govern the Specifications.

- 4 Where the Specifications do not fully agree with schedules on the Drawings, the schedules shall govern. Actual numerical dimensions indicated on the Drawings govern scale measurements and large scale details govern small scale drawings.
 - 5 Materials, equipment and devices called for on the Drawings and not indicated herein, shall be completely provided and installed as though it were fully described herein.
 - 6 Materials, equipment and devices called for herein shall be completely provided and installed, whether or not it is fully detailed, scheduled or indicated on the Drawings.
- C. The Contractor shall examine the Drawings and Specifications of the other portions of the work for fixtures and finishes in connection with this work. The Contractor shall carefully examine the Drawings to determine the general construction conditions, and shall familiarize himself with all limitations caused by such conditions.
 - D. When discrepancies exist between scale and dimension, or between the Drawings of the various portions of the work, they shall be called to the attention of the Owner's Representative for further instruction, whose instructions shall be final and binding and work promptly resumed without any additional cost to the Owner.
 - E. Review the construction details of the building(s) as illustrated on the Drawings of the other portions of the work, i.e., architectural, structural, civil, landscape, etc., and be guided thereby. Route conduits and set all boxes as required by the pace of the general construction.
 - F. The Drawings diagrammatically show the sizes and locations of the various equipment and devices, and the sizes of the major interconnecting wires, without showing exact details as to elevations, offsets, control wiring and other installation requirements. Carefully layout the work at the site to conform to the architectural and structural conditions, to avoid obstructions and to permit proper grading of pipe associated with other portions of the work. In cooperation with other Contractors, determine the exact location of equipment and devices and connections thereto by reference to the submittals and rough-in drawings, and by measurements at the site. Make minor relocations necessitated by the conditions at the site, or directed by the Owner's Representative, without additional cost to the Owner.
 - G. The Drawings and Specifications are intended to describe and illustrate systems which will not

interfere with the structure of the building(s), fit into the available spaces, and insure complete and satisfactory operating installations.

Prepare installation drawings as required for all critical areas illustrating the installation of the work in this Section as related to the work of all other Sections and correct all interferences with the other portions of the work or with the building structures before the work proceeds.

- H. The Drawings do not indicate the existing electrical installations other than to identify modifications or extensions thereto. Visit the site and ascertain the conditions to be met and the work to be accomplished in removing and modifying the existing work, and in installing the new work. Failure to comply with this shall not constitute grounds for any additional payment in connection with removing or modifying any part of the existing installation or installing any new or temporary work under this Section.

1.11 SUBMITTALS

- A. Submit product data and shop drawings in accordance with the Specifications.
- B. Process product data and shop drawings to insure that the proposed materials, equipment and devices conform to the requirements of the Contract Documents, and that there are no omissions or duplications. Provide layouts, fabrication information and data for systems, materials, equipment and devices proposed for the project.
- C. Submittals shall be provided for review and approval on all systems, equipment, devices and materials proposed for use on this project. Submittals shall include, but not be limited to, the following:
 - 1 Lighting and Appliance Panelboards
 - 2 Disconnect Switches
 - 3 Circuit Breakers and Fuses
 - 4 Materials: conduit, conductors, connectors, supports, etc.
 - 5 Lighting Fixtures, Lamps and Control Systems/Devices
 - 6 Wiring Devices
 - 7 Transformers
 - 8 Distribution Panelboards
 - 9 Motor Control Center
 - 10 As indicated on each submittal section
- D. The product data shall not consist of manufacturer's catalogs or cut sheets that contain no indication of the exact item offered. The submission on individual items shall designate the exact item offered.
- E. Do not submit detailed quantitative listings of materials, equipment and devices. It is the Contractor's responsibility to provide proper sizes and quantities to conform to Contract Documents.
- F. Assemble submittals on related items procured from a single manufacturer in bound brochures

or other suitable package form, rather than submitting a multiplicity of loose sheets.

- G. Prepare shop drawings whenever equipment proposed varies in physical size and arrangement from that indicated thus causing rearrangement of equipment space, where tight spaces require extreme coordination between this work and other work, where called for elsewhere in these Specifications and where specifically requested by the Owner's Representative. Shop drawings shall be prepared at a scale of not less than 1/4 inch equals 1 foot.
- H. The Contractor shall sign the submittal as an indication of compliance with the Contract Documents. If there are any deviations from the Contract Documents, he shall so indicate on the submittal. Any deviations not so indicated shall be cause for rejection and removal of the non-complying equipment at the Contractor's expense.

1.12 SUBSTITUTIONS

- A. Where a single manufacturer is mentioned by trade name or manufacturer's name, unless specifically noted otherwise, it is the only manufacturer that will be accepted.
- B. Where multiple manufacturers are listed, none other than those manufacturers will be accepted.
- C. Manufacturers not listed will be considered for substitution prior to bid only. The substitute manufacturer shall submit a complete copy of the appropriate technical specification section minimum seven (7) business days prior to bid with each sub-paragraph noted with the comment, "compliance", "deviation", "alternate" or "not applicable". In the case of non-primary, vendor-supplied items, the name of the sub-vendor supplying said item, including model number, shall be indicated.
 - 1 By noting the term "compliance" or "C", it shall be understood that the manufacturer is in full compliance with the item specified and will provide exactly the same with no deviations.
 - 2 By noting the term "deviation" or "D", it shall be understood that the manufacturer prefers to provide a different component in lieu of that specified. Manufacturer shall indicate all deviations.
 - 3 By noting the term "alternate" or "A", it shall be understood that the manufacturer proposes to provide the same operating function but prefers to do it in a different manner. An alternate shall be fully described as to what the manufacturer proposes to provide.
 - 4 By noting the term "not applicable" or "N/A", it shall be understood that the specified item is not applicable to the project.

- D. It shall be understood that space allocations have been made on the basis of present and known future requirements and the dimensions of items of equipment or devices of a particular manufacturer whether indicated or not. If any item of equipment or device is offered in substitution which differs substantially in dimension or configuration from that indicated on the Drawings or specifications, provide as part of the submittal 1/4 inch equals 1 foot scaled drawings showing that the substitute can be installed in the space available without interfering with other portions of the work or with access for operations and maintenance in the completed project.
- E. Where substitute equipment or devices requiring different arrangement or connections from that indicated is accepted by the Owner's Representative, install the equipment or devices to operate properly and in harmony with the intent of the Contract Documents, making all incidental changes in piping, ductwork or wiring resulting from the equipment or device selection without any additional cost to the Owner. The Contractor shall pay all additional costs incurred by other portions of the work in connection with the substituted equipment or device.
- F. The Owner's Representative reserves the right to call for samples of any item of material, equipment or device offered in substitution, together with a sample of the specific item when, in their opinion, the quality of the item and/or the appearance is involved, and it is deemed that an evaluation of the item may be better made by visual inspection.
- G. When any request for a substitution of material, equipment or device is submitted and rejected, the item named in the Contract Documents shall be furnished. Repetitive submittal of substitutions for the same item will not be considered.

1.13 INSTALLATION DRAWINGS

- A. Prepare installation drawings for coordinating the work of this Section with the work of other Sections, to illustrate its concealment in finished spaces, to avoid obstructions, and to demonstrate the adaptability of any item of material, equipment or device in the space upon which the Contract Documents are based.
- B. Use these drawings in the field for the actual installation of this work. Provide three (3) copies, not for approval, to the Owner's Representative for his information, review and record.

1.14 WORKMANSHIP AND INSTALLATION

- A. In no case shall the Contractor provide a class of material, equipment, device or workmanship less than that required by the Contract Documents or applicable codes,

regulations, ordinances or standards. All modifications which may be required by a local authority having legal jurisdiction over all or any part of the work shall be made by the Contractor without any additional charge. In all cases where such authority requires deviations from the requirements of the Drawings or Specifications, the Contractor shall report same to the Owner's Representative and shall secure his approval before the work is started.

- B. The work shall be performed by properly licensed technicians skilled in their respective trades. All materials, equipment and devices shall be installed in accordance with the recommendations of the manufacturer and in the best standard practice to bring about results of a first class condition.
- C. The NECA "Standards of Installation" as published by the National Electrical Contractors Association shall be considered a part of these Specifications, except as specifically modified by other provisions contained in these Specifications.

1.15 INSPECTION OF SITE

- A. The accompanying drawings do not indicate existing installations other than to identify modifications of and extensions thereto. The Contractor shall visit the site, inspect the installations and ascertain the conditions to be met and the work to be performed. Failure to comply with this shall not constitute ground for any additional payments in connection with removing or modifying any part of the existing installations and/or installing any new work under this Section.
- B. Review construction details of the adjacent building presently under construction during the site inspection and include all work required to modify the existing installations and install new materials, comprising a part of the installation. Review all construction details of the new building as illustrated on the drawings and be guided thereby.

1.16 WARRANTY

- A. All materials, equipment, devices and workmanship shall be warranted for a period of one year from the date of acceptance by the Owner's Representative for beneficial use by the Owner, except that where specific equipment is noted to have extended warranties. The warranty shall be in accordance with AIA Document A201. The Contractor shall be responsible for the proper registration of these warranties so that the Owner can make all proper claims should future need develop.
- B. The Contractor shall furnish to the Owner's Representative for transmittal to the Owner, the name, address and telephone number of those persons responsible for service on

systems and equipment covered by the warranty.

1.17 OPERATION PRIOR TO ACCEPTANCE

- A. When any equipment is operable, and it is to the advantage of the Contractor to operate the equipment, the Contractor may do so provided that he properly supervises the operation, and retains full responsibility for the equipment operated. Regardless of whether or not the equipment has or has not been operated, the Contractor shall clean the equipment properly, make required adjustments and complete punch list items before final acceptance by the Owner.

1.18 INSTRUCTION OF OWNER'S PERSONNEL

- A. Provide the services of competent engineers and/or technicians acceptable to the Owner's Representative to instruct other representatives of the Owner in the complete and detailed operation of each item of equipment or device of all the various electrical systems. These instructions shall be provided for whatever periods may be necessary to accomplish the desired results. Upon completion of these instructions, the Contractor shall obtain a letter of release, acknowledged by the Owner or his authorized representative, stating the dates on which the various kinds of instruction were given, and the personnel to whom the instructions were given.
- B. The Contractor shall be fully responsible for proper maintenance of equipment and systems until the instructions have been given to the Owner's personnel and the letter of release acknowledged.
- C. In providing the instructions to the Owner's personnel, the written operating and maintenance manuals shall be followed in all instances, and the Owner's personnel shall be familiarized with such manuals. Operating and maintenance manuals used for instructions shall include wiring diagrams, manufacturer's operating and maintenance instructions, parts lists (with sources identified), and other data as appropriate for each system.

1.19 SCHEDULE AND SEQUENCE OF WORK

- A. The Contractor shall meet and cooperate with the Owner and Owner's Representative to schedule and sequence this work so as to insure meeting scheduled completion dates and avoid delaying other portions of the work. Work requiring special sequencing shall be at no additional cost to the Owner and shall have no impact on the schedule.

1.20 INSTALLATION INSPECTIONS AND CERTIFICATIONS

- A. Obtain timely inspections of the installation by the regulatory authorities. Remedy any deficiencies to the satisfaction of the inspecting official.

- B. Upon final completion of the work, obtain certificates of acceptance from the regulatory authorities. Deliver the certificates to the Owner's Representative for transmission to the Owner.

1.21 EQUIPMENT INSTALLATION

- A. Install equipment and devices in a manner to permit access to all surfaces or components, requiring such access, without the need to disassemble other unrelated parts of the work.
- B. Equipment specified to be factory assembled and tested prior to shipment shall not be disassembled at the job site and reassembled at its final location. Apparatus not so specified may be disassembled and reassembled in the proper location.
- C. Furnish all scaffolding, rigging and hoisting required for the installation of all the work.

1.22 CONCRETE HOUSEKEEPING PADS

- A. Concrete housekeeping pads shall be provided for all floor mounted equipment, unless noted or required otherwise.
- B. All pads shall be not less than 3-1/2" high and extend a maximum 3" beyond the actual equipment size. Coordinate the proper size of the pad with the equipment furnished. Pads shall be poured in forms built of new dressed lumber with corners chamfered using sheet metal or triangular wood strips nailed to the form. Use 6 x 6 No. 3 mesh for reinforcing. Install heavy duty adjustable anchor bolts, set in the form and positioned using templates, prior to pouring concrete. After the equipment is set on the pad, the equipment shall be aligned, leveled and fully grouted to the pad and all void spaces shall be filled with a non-shrinking grout.
- C. Perform all concrete work specified to be provided under this Section in strict accordance with the applicable provisions of Section, CONCRETE.

1.23 SLEEVES

- A. Each conduit, regardless of material, which passes through a concrete slab, masonry wall, or roof or portion of the building structure shall be free from the structure and shall pass through a sleeve.
- B. All sleeves shall be constructed from electrical-metallic tubing or equivalent weight galvanized steel tubing and shall be flush on both sides of the surface penetrated, unless noted otherwise. All sleeves penetrating the roof areas shall extend a minimum 10 inches above the roof with approved weatherproof counterflashing attached to the conduit above the roof. All sleeves penetrating floors shall extend a minimum of 6 inches above the finished floors. The sleeves shall be sized to allow free passage of the conduit to be inserted.
- C. Sleeves passing through walls or floors on or

below grade or in moist areas shall be constructed of galvanized rigid steel and shall be designed with a suitable flange in the center to form a waterproof passage. After the conduit has been installed in the sleeves, the void space around the conduit shall be caulked and filled with an asphalt-base compound to insure a waterproof penetration. Jute twine caulking shall not be used due to susceptibility to termite infestation.

1.24 ESCUTCHEONS

- A. In each finished space, provided a chromium plated, sectional escutcheon on each conduit, or hanger rod penetrating a wall, floor or ceiling.
- B. Size escutcheons and collars to fit snugly around conduit and rods.
- C. Where required, provide escutcheons with set screws so that they fit snugly against the finished surface.

1.25 ACCESS PANELS

- A. Provide wall and ceiling access panels for unrestricted access to all concealed electrical equipment items and devices installed behind furrings, chases or non-removable suspended ceilings.
- B. Access panels shall be UL listed and labeled as required to suit the fire rating of the surface in which installed, with mounting straps, concealed hinges, screwdriver locks, 180 degree open door design, 16 gauge steel construction and door and frame finished in prime coat finish. Panels shall be 12-inch by 12-inch minimum size, but shall be larger as the access requirement of the concealed electrical equipment item or device increases.

1.26 SEALING OF PENETRATIONS

- A. All penetrations in horizontal or vertical fire-rated construction shall be sealed using approved fire-rated sealing materials equivalent to the following:
 - 1 Foam: Dow Corning 3-6548 RTV silicone foam, liquid component Part 4 (black) and liquid component Part B (off-white).
 - 2 Sealant: Dow Corning 96-081 RTV silicone adhesive sealant.
 - 3 Damming Materials: Mineral fiberboard, mineral fiber matting, mineral fiber putty, plywood or particle board, as selected by applicator.
- B. Preparation: Remove combustible materials and loose impediments from penetration opening and involved surfaces. Remove free liquid and oil from penetration surfaces.
- C. Installation: In accordance with manufacturer's instructions, install damming materials and sealant to cover and seal penetration openings; inject foam mixtures into openings.
- D. In addition to the Dow Corning products, equal products by Spec Seal Firestop Products,

3M Fire Barrier or CS240 Firestop are acceptable.

1.27 PROTECTION OF APPARATUS

- A. At all times take every precaution to properly protect apparatus from damage due to dust, dirt, water, etc. or from damage due to physical forces. Include the erection of temporary shelters as required, to adequately protect any apparatus stored at the site, the cribbing of any apparatus directly above the construction, and the covering of apparatus in the incomplete building with tarpaulins or other protective covering. Failure on the part of the Contractor to comply with the above to the entire satisfaction of the Owner's Representative will be sufficient cause for the rejection of the pieces of apparatus in question.
- B. Responsibility for the protection of apparatus extend also to existing apparatus involved in this Section of the work, whether such apparatus is designated to be used temporarily and later removed, or is to be reused as a part of the permanent installation. Erect temporary sheltering structures, provide temporary bracing and supports, or cover equipment as required or directed to afford proper protection for that equipment.
- C. The Contractor shall protect this work and the work of all other Contractors from damage by his work or workmen and shall make good any damage thus caused. He shall also be responsible for the proper protection of his equipment, machinery, materials and accessories delivered and installed on the job.

1.28 INSTALLATION OF CONTROL AND OPERATING DEVICES

- A. The highest operable part of controls (light switches, dimmer switches, emergency power off devices, etc.), receptacles (electrical and communications) and other operable devices shall be 48" above finish floor. The lowest operable part shall be no less than 15" above finished floor. For purposes of uniformity, unless noted otherwise, the top of a device shall be maximum 48" AFF and the bottom of a device shall be minimum 15" AFF. Refer to the electrical symbols list on the Drawings for specific requirements.
- B. Visual alarm appliances shall be placed 80" above finished floor (the highest floor level within a space) or 6" below the ceiling, whichever is lower.

1.29 INSTALLATION AND CONNECTION OF OTHER SECTION'S EQUIPMENT

- A. Verify the electrical requirements of all equipment furnished under other Sections, separate contracts, or by the Owner. Install conduit, power wiring, control wiring, devices, etc. as required for complete operation of all equipment.

1.30 OPTION TO RELOCATE OUTLETS AND RELATED DEVICES

- A. The location of power, data and telephone may be relocated at the Owner's option, at no additional cost to the Owner, to a point within 10 feet of their present location provided the Contractor is notified prior to installation.

1.31 COOPERATION AND CLEAN-UP

- A. It shall be the responsibility of the Contractor to cooperate fully to keep the job site in a clean and safe condition. Upon the Contractor shall immediately remove all of his tools, equipment, surplus materials and debris.
- B. After the installation is complete and before the equipment is energized, clean the interior and exterior of all equipment thoroughly. Clean equipment, removing all debris, rubbish and foreign materials. Each component shall be cleaned and all dust and other foreign material. Components shall be cleaned of oxidation. The inside and outside of all switchgear shall also be wiped clean with lemon-oil rag after all other cleaning is complete. Any portion of the work requiring touch-up finishing shall be so finished to equal the specified finish on the product.

1.32 RECORD DRAWINGS AND DOCUMENTATION FOR OWNER

- A. The Contractor shall obtain at his own expense a complete set of blue-line prints on which to keep an accurate record of the installation of all materials, equipment and devices covered by the Contract. The Contractor shall record up to date information at least once a week and retain the set of prints on site for periodic review by the Architect/Engineer. The record drawings shall indicate the location of all equipment and devices, and the routing of all systems. If the Contractor prepared large scale installation drawings of electrical rooms, conduit routing, busduct, routing, etc., these drawings or reproducible sepia's therefrom shall be revised as required to accurately illustrate the actual installation. All conduit buried in concrete slabs, walls and below grade shall be located by dimension; both horizontally and by vertical elevation, unless a surface mounted device in each space indicates the exact location.
- B. Upon anticipated completion of the job, obtain one complete reproducible set of the original drawings on which to neatly, legibly

outlets, wall switches and other related devices

and accurately transfer all project related notations and deliver these record drawings to the Architect/Engineer at job completion before final payment and delivery to the Owner. This information shall be delivered prior to final acceptance.

- C. The Contractor shall accumulate in duplicate during the job progress, the following data prepared in indexed 3-ring looseleaf, hard-back binders sized for 8-1/2 inch by 11 inch sheets. No binder shall exceed 3-1/2 inches thick. This data shall be turned over to the Owner's Representative for review and subsequent delivery to the Owner prior to final acceptance.
 - 1 Warranties, guarantees and manufacturer's directions on material, equipment and devices covered by the Contract.
 - 2 Approved lighting fixture brochures, wiring diagrams and control diagrams.
 - 3 Copies of approved submittals and shop drawings.
 - 4 Operating instructions and recommended maintenance procedures for major apparatus.
 - 5 Copies of all other data and/or drawings required during construction.
 - 6 Repair parts list of major apparatus, including name, address and telephone number of local supplier or representative.
 - 7 Tag charts and diagrams hereinbefore specified.

1.33 FINAL OBSERVATION

- A. The purpose of the final observation is to determine whether the Contractor has completed the construction in accordance with the Contract Documents and that in the Owner Representative's opinion the installation is satisfactory for final acceptance by the Owner.
- B. It shall be the responsibility of the Contractor to assure that the installation is ready for final acceptance prior to calling upon the Owner's Representative to make a final observation.

PART 2 - PRODUCTS (NOT USED)**PART 3 - EXECUTION (NOT USED)**

END OF SECTION

SECTION 26 01 26

ELECTRICAL TESTING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section applies to all sections of Division 26.
- B. Furnish and install electrical systems, materials, equipment, and accessories in accordance with the specifications and drawings. Capacities and ratings of motors, transformers, conductors and cable, switchboards, switchgear, panelboards, motor control centers, generators, automatic transfer switches, and other items and arrangements for the specified items are shown on the drawings.
- C. Electrical service entrance equipment and arrangements for temporary and permanent connections to the electric utility company's system shall conform to the electric utility company's requirements. Coordinate fuses, circuit breakers and relays with the electric utility company's system, and obtain electric utility company approval for sizes and settings of these devices.
- D. Conductor ampacities specified or shown on the drawings are based on copper conductors, with the conduit and raceways sized per NEC. Aluminum conductors are prohibited.

1.2 MINIMUM REQUIREMENTS

- A. The International Building Code (IBC), National Electrical Code (NEC), Underwriters Laboratories, Inc. (UL), and National Fire Protection Association (NFPA) codes and standards are the minimum requirements for materials and installation.
- B. The drawings and specifications shall govern in those instances where requirements are greater than those stated in the above codes and standards.

1.3 TEST STANDARDS

- A. All materials and equipment shall be listed, labeled, or certified by a Nationally Recognized Testing Laboratory (NRTL) to meet Underwriters Laboratories, Inc. (UL), standards where test standards have been established. Materials and equipment which are not covered by UL standards will be accepted, providing that materials and equipment are listed, labeled, certified or otherwise determined to meet the safety requirements of a NRTL. Materials and equipment which no NRTL accepts, certifies, lists, labels, or determines to be safe, will be considered if inspected or tested in accordance with national industrial standards, such as ANSI, NEMA, and NETA. Evidence of compliance

shall include certified test reports and definitive shop drawings.

B. Definitions:

- 1. Listed: Materials and equipment included in a list published by an organization that is acceptable to the Authority Having Jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production or listed materials and equipment or periodic evaluation of services, and whose listing states that the materials and equipment either meets appropriate designated standards or has been tested and found suitable for a specified purpose.
- 2. Labeled: Materials and equipment to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the Authority Having Jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled materials and equipment, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.
- 3. Certified: Materials and equipment which:
 - a. Have been tested and found by a NRTL to meet nationally recognized standards or to be safe for use in a specified manner.
 - b. Are periodically inspected by a NRTL.
 - c. Bear a label, tag, or other record of certification.
- 4. Nationally Recognized Testing Laboratory: Testing laboratory which is recognized and approved by the Secretary of Labor in accordance with OSHA regulations.

1.4 QUALIFICATIONS (PRODUCTS AND SERVICES)

- A. Manufacturer's Qualifications: The manufacturer shall regularly and currently produce, as one of the manufacturer's principal products, the materials and equipment specified for this project, and shall have manufactured the materials and equipment for at least three years.
- B. Product Qualification:
 - 1. Manufacturer's materials and equipment shall have been in satisfactory operation, on three installations of similar size and type as this project, for at least three years.
 - 2. The Government reserves the right to require the Contractor to submit a list of

installations where the materials and equipment have been in operation before approval.

- C. Service Qualifications: There shall be a permanent service organization maintained or trained by the manufacturer which will render satisfactory service to this installation within // four // eight // hours of receipt of notification that service is needed. Submit name and address of service organizations.

1.5 APPLICABLE PUBLICATIONS

- A. Applicable publications listed in all Sections of Division 26 are the latest issue, unless otherwise noted.
- B. Products specified in all sections of Division 26 shall comply with the applicable publications listed in each section.

1.6 MANUFACTURED PRODUCTS

- A. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, and for which replacement parts shall be available.
- B. When more than one unit of the same class or type of materials and equipment is required, such units shall be the product of a single manufacturer.
- C. Equipment Assemblies and Components:
1. Components of an assembled unit need not be products of the same manufacturer.
 2. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
 3. Components shall be compatible with each other and with the total assembly for the intended service.
 4. Constituent parts which are similar shall be the product of a single manufacturer.
- D. Factory wiring and terminals shall be identified on the equipment being furnished and on all wiring diagrams.
- E. When Factory Testing Is Specified:
1. The Government shall have the option of witnessing factory tests. The Contractor shall notify the Government through the //Resident Engineer// //COTR// a minimum of 15 working days prior to the manufacturer's performing the factory tests.
 2. Four copies of certified test reports shall be furnished to the //Resident Engineer// //COTR// two weeks prior to final inspection and not more than 90 days after completion of the tests.
 3. When materials and equipment fail factory tests, and re-testing and re-inspection is required, the Contractor shall

be liable for all additional expenses for the Government to witness re-testing.

1.7 VARIATIONS FROM CONTRACT REQUIREMENTS

- A. Where the Government or the Contractor requests variations from the contract requirements, the connecting work and related components shall include, but not be limited to additions or changes to branch circuits, circuit protective devices, conduits, wire, feeders, controls, panels and installation methods.

1.8 MATERIALS AND EQUIPMENT PROTECTION

- A. Materials and equipment shall be protected during shipment and storage against physical damage, vermin, dirt, corrosive substances, fumes, moisture, cold and rain.
1. Store materials and equipment indoors in clean dry space with uniform temperature to prevent condensation.
 2. During installation, equipment shall be protected against entry of foreign matter, and be vacuum-cleaned both inside and outside before testing and operating. Compressed air shall not be used to clean equipment. Remove loose packing and flammable materials from inside equipment.
 3. Damaged equipment shall be repaired or replaced, as determined by the //Resident Engineer// //COTR//.
 4. Painted surfaces shall be protected with factory installed removable heavy kraft paper, sheet vinyl or equal.
 5. Damaged paint on equipment shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas are not obvious.

1.9 WORK PERFORMANCE

- A. All electrical work shall comply with the requirements of NFPA 70 (NEC), NFPA 70B, NFPA 70E, OSHA Part 1910 subpart J – General Environmental Controls, OSHA Part 1910 subpart K – Medical and First Aid, and OSHA Part 1910 subpart S – Electrical, in addition to other references required by contract.
- B. Job site safety and worker safety is the responsibility of the Contractor.
- C. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished in this manner for the required work, the following requirements are mandatory:
1. Electricians must use full protective equipment (i.e., certified and tested insulating material to cover exposed energized electrical components, certified and tested insulated tools, etc.) while working on energized systems in accordance with NFPA 70E.

2. Before initiating any work, a job specific work plan must be developed by the Contractor with a peer review conducted and documented by the //Resident Engineer// //COTR// and Medical Center staff. The work plan must include procedures to be used on and near the live electrical equipment, barriers to be installed, safety equipment to be used, and exit pathways.
3. Work on energized circuits or equipment cannot begin until prior written approval is obtained from the //Resident Engineer// //COTR//.
- D. For work that affects existing electrical systems, arrange, phase and perform work to assure minimal interference with normal functioning of the facility. Refer to Article OPERATIONS AND STORAGE AREAS under Section 01 00 00, GENERAL REQUIREMENTS.
- E. New work shall be installed and connected to existing work neatly, safely and professionally. Disturbed or damaged work shall be replaced or repaired to its prior conditions, as required by Section 01 00 00, GENERAL REQUIREMENTS.
- F. Coordinate location of equipment and conduit with other trades to minimize interference.

1.10 EQUIPMENT INSTALLATION AND REQUIREMENTS

- A. Equipment location shall be as close as practical to locations shown on the drawings.
- B. Working clearances shall not be less than specified in the NEC.
- C. Inaccessible Equipment:
 1. Where the Government determines that the Contractor has installed equipment not readily accessible for operation and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the Government.
 2. "Readily accessible" is defined as being capable of being reached quickly for operation, maintenance, or inspections without the use of ladders, or without climbing or crawling under or over obstacles such as, but not limited to, motors, pumps, belt guards, transformers, piping, ductwork, conduit and raceways.
- D. Electrical service entrance equipment and arrangements for temporary and permanent connections to the electric utility company's system shall conform to the electric utility company's requirements. Coordinate fuses, circuit breakers and relays with the electric utility company's system, and obtain electric utility company approval for sizes and settings of these devices.

1.11 EQUIPMENT IDENTIFICATION

- A. In addition to the requirements of the NEC, install an identification sign which clearly

indicates information required for use and maintenance of items such as switchboards and switchgear, panelboards, cabinets, motor controllers, fused and non-fused safety switches, generators, automatic transfer switches, separately enclosed circuit breakers, individual breakers and controllers in switchboards, switchgear and motor control assemblies, control devices and other significant equipment.

- B. Identification signs for Normal Power System equipment shall be laminated black phenolic resin with a white core with engraved lettering. Identification signs for Essential Electrical System (EES) equipment, as defined in the NEC, shall be laminated red phenolic resin with a white core with engraved lettering. Lettering shall be a minimum of 12 mm (1/2 inch) high. Identification signs shall indicate equipment designation, rated bus amperage, voltage, number of phases, number of wires, and type of EES power branch as applicable. Secure nameplates with screws.
- C. Install adhesive arc flash warning labels on all equipment as required by NFPA 70E. Label shall indicate the arc hazard boundary (inches), working distance (inches), arc flash incident energy at the working distance (calories/cm²), required PPE category and description including the glove rating, voltage rating of the equipment, limited approach distance (inches), restricted approach distance (inches), prohibited approach distance (inches), equipment/bus name, date prepared, and manufacturer name and address.

1.12 SUBMITTALS

- A. Submit to the //Resident Engineer// //COTR// in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. The Government's approval shall be obtained for all materials and equipment before delivery to the job site. Delivery, storage or installation of materials and equipment which has not had prior approval will not be permitted.
- C. All submittals shall include six copies of adequate descriptive literature, catalog cuts, shop drawings, test reports, certifications, samples, and other data necessary for the Government to ascertain that the proposed materials and equipment comply with drawing and specification requirements. Catalog cuts submitted for approval shall be legible and clearly identify specific materials and equipment being submitted.
- D. Submittals for individual systems and equipment assemblies which consist of more than one item or component shall be made

for the system or assembly as a whole. Partial submittals will not be considered for approval.

1. Mark the submittals, "SUBMITTED UNDER SECTION _____".
 2. Submittals shall be marked to show specification reference including the section and paragraph numbers.
 3. Submit each section separately.
- E. The submittals shall include the following:
1. Information that confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, manuals, pictures, nameplate data, and test reports as required.
- //2. Submittals are required for all equipment anchors and supports. Submittals shall include weights, dimensions, center of gravity, standard connections, manufacturer's recommendations and behavior problems (e.g., vibration, thermal expansion, etc.) associated with equipment or piping so that the proposed installation can be properly reviewed. Include sufficient fabrication information so that appropriate mounting and securing provisions may be designed and attached to the equipment.//
3. Elementary and interconnection wiring diagrams for communication and signal systems, control systems, and equipment assemblies. All terminal points and wiring shall be identified on wiring diagrams.
 4. Parts list which shall include information for replacement parts and ordering instructions, as recommended by the equipment manufacturer.
- F. Maintenance and Operation Manuals:
1. Submit as required for systems and equipment specified in the technical sections. Furnish in hardcover binders or an approved equivalent.
 2. Inscribe the following identification on the cover: the words "MAINTENANCE AND OPERATION MANUAL," the name and location of the system, material, equipment, building, name of Contractor, and contract name and number. Include in the manual the names, addresses, and telephone numbers of each subcontractor installing the system or equipment and the local representatives for the material or equipment.
 3. Provide a table of contents and assemble the manual to conform to the table of contents, with tab sheets placed before instructions covering the subject. The instructions shall be legible and easily

read, with large sheets of drawings folded in.

4. The manuals shall include:
 - a. Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of the equipment.
 - b. A control sequence describing start-up, operation, and shutdown.
 - c. Description of the function of each principal item of equipment.
 - d. Installation instructions.
 - e. Safety precautions for operation and maintenance.
 - f. Diagrams and illustrations.
 - g. Periodic maintenance and testing procedures and frequencies, including replacement parts numbers.
 - h. Performance data.
 - i. Pictorial "exploded" parts list with part numbers. Emphasis shall be placed on the use of special tools and instruments. The list shall indicate sources of supply, recommended spare and replacement parts, and name of servicing organization.
 - j. List of factory approved or qualified permanent servicing organizations for equipment repair and periodic testing and maintenance, including addresses and factory certification qualifications.
- G. Approvals will be based on complete submission of shop drawings, manuals, test reports, certifications, and samples as applicable.
- H. After approval and prior to installation, furnish the //Resident Engineer// //COTR// with one sample of each of the following:
 1. A minimum 300 mm (12 inches) length of each type and size of wire and cable along with the tag from the coils or reels from which the sample was taken. The length of the sample shall be sufficient to show all markings provided by the manufacturer.
 2. Each type of conduit coupling, bushing, and termination fitting.
 3. Conduit hangers, clamps, and supports.
 4. Duct sealing compound.
 5. Each type of receptacle, toggle switch, lighting control sensor, outlet box, manual motor starter, device wall plate, engraved nameplate, wire and cable splicing and terminating material, and branch circuit single pole molded case circuit breaker.

1.13 SINGULAR NUMBER

- A. Where any device or part of equipment is referred to in these specifications in the

singular number (e.g., "the switch"), this reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the drawings.

//1.14 POLYCHLORINATED BIPHENYL (PCB) EQUIPMENT

- A. This project requires the removal, transport, and disposal of electrical equipment containing Polychlorinated Biphenyls (PCB) in accordance with the Federal Toxic Substances Control Act (TSCA).
- B. The equipment to be removed is shown on the drawings.
- C. The selective demolition shall be in accordance with Section 02 41 00, DEMOLITION.//

1.15 ACCEPTANCE CHECKS AND TESTS

- A. The Contractor shall furnish the instruments, materials, and labor for tests.
- B. Where systems are comprised of components specified in more than one section of Division 26, the Contractor shall coordinate the installation, testing, and adjustment of all components between various manufacturer's representatives and technicians so that a complete, functional, and operational system is delivered to the Government.
- C. When test results indicate any defects, the Contractor shall repair or replace the defective materials or equipment, and repeat the tests. Repair, replacement, and retesting

shall be accomplished at no additional cost to the Government.

1.16 WARRANTY

- A. All work performed and all equipment and material furnished under this Division shall be free from defects and shall remain so for a period of one year from the date of acceptance of the entire installation by the Contracting Officer for the Government.

1.17 INSTRUCTION

- A. Instruction to designated Government personnel shall be provided for the particular equipment or system as required in each associated technical specification section.
- B. Furnish the services of competent instructors to give full instruction in the adjustment, operation, and maintenance of the specified equipment and system, including pertinent safety requirements. Instructors shall be thoroughly familiar with all aspects of the installation, and shall be trained in operating theory as well as practical operation and maintenance procedures.
- C. A training schedule shall be developed and submitted by the Contractor and approved by the //Resident Engineer// //COTR// at least 30 days prior to the planned training.

PART 2 - PRODUCTS (NOT USED)**PART 3 - EXECUTION (NOT USED)**

END OF SECTION

SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.3 SUBMITTALS

- A. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.4 QUALITY ASSURANCE

- A. Listing and Labeling: Provide wires and cables specified in this Section that are listed and labeled.
 - 1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.
- B. Comply with NFPA 70.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver wires and cables according to NEMA WC 26.

1.6 COORDINATION

- A. Coordinate layout and installation of cables with other installations.
- B. Revise locations and elevations from those indicated, as required to suit field conditions and as approved by Architect.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Wires and Cables:
 - a. American Insulated Wire Corp.; Leviton Manufacturing Co.
 - b. BICC Brand-Rex Company.
 - c. Carol Cable Co., Inc.
 - d. Senator Wire & Cable Company.
 - e. Southwire Company.
 - 2. Connectors for Wires and Cables:
 - a. AMP Incorporated.
 - b. General Signal; O-Z/Gedney Unit.
 - c. Monogram Co.; AFC.
 - d. Square D Co.; Anderson.
 - e. 3M Company; Electrical Products Division.

2.2 BUILDING WIRES AND CABLES

- A. UL-listed building wires and cables with conductor material, insulation type, cable

construction, and rating as specified in Part 3 "Wire and Insulation Applications" Article.

- B. Rubber Insulation Material: Comply with NEMA WC 3.
- C. Thermoplastic Insulation Material: Comply with NEMA WC 5.
- D. All wire shall be soft drawn annealed copper (with conductivity of not less than 98% that of pure copper) with THHN/THWN 600-volt color coded insulation.
- E. Ethylene Propylene Rubber Insulation Material: Comply with NEMA WC 8.
- F. Conductor Material: Copper.
- G. Stranding: Solid conductor for No. 10 AWG and smaller; stranded conductor for larger than No. 10 AWG.
- H. Plenum rated cable for all cables above the ceiling.

2.3 CONNECTORS AND SPLICES

- A. UL-listed, factory-fabricated wiring connectors of size, ampacity rating, material, type, and class for application and service indicated. Comply with Project's installation requirements and as specified in Part 3 "Wire and Insulation Applications" Article.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine raceways and building finishes to receive wires and cables for compliance with requirements for installation tolerances and other conditions affecting performance of wires and cables. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 WIRE AND INSULATION APPLICATIONS

- A. Service Entrance: TypeXHHW-2 or THWN, in raceway.
- B. Feeders: Type 75C insulation THWN-2, in raceway; stranded for #8 and larger; solid for #10 and smaller.
- C. Fire-Pump Feeder: Type MI, 3-conductor.
- D. Branch Circuits: Type THWN-2 in raceway, stranded for #10 and larger; solid for #8 and smaller; minimum #12 size.
- E. Fire Alarm Circuits: Type THWN-2, in raceway.
- F. Class 1 Control Circuits: Type THWN-2, in raceway.
- G. Class 2 Control Circuits: Type THWN-2, in raceway.
- H. Equipment or any device rated 100 amperes or less, conductor shall be rated 60C as per National Electrical Code.
- I. Equipment or any device rated over 100 amperes, conductor shall be rated 75C as per National Electrical Code.

3.3 INSTALLATION

- A. Install wires and cables as indicated, according to manufacturer's written

instructions and NECA's "Standard of Installation."

- B. Remove existing wires from raceway before pulling in new wires and cables.
- C. Pull Conductors: Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables, parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Support cables according to Section "Basic Electrical Materials and Methods."
- G. Seal around cables penetrating fire-rated elements according to Section "Firestopping."
- H. Identify wires and cables according to Section "Basic Electrical Materials and Methods."
- I. Identify wires and cables according to Section "Electrical Identification."

3.4 CONNECTIONS

- A. Conductor Splices: Keep to minimum.
- B. Install splices and tapes that possess equivalent or better mechanical strength

and insulation ratings than conductors being spliced.

- C. Use splice and tap connectors compatible with conductor material.
- D. Use oxide inhibitor in each splice and tap connector for aluminum conductors.
- E. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches (300 mm) of slack.
- F. Connect outlets and components to wiring and to ground as indicated and instructed by manufacturer.
- G. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.5 FIELD QUALITY CONTROL

- A. Testing: On installation of wires and cables and before electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
 - 1. Procedures: Perform each visual and mechanical inspection and electrical test stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.
- B. Correct malfunctioning conductors and cables at Project site, where possible, and retest to demonstrate compliance; otherwise, remove and replace with new units and retest.

END OF SECTION

SECTION 26 05 26
GROUNDING AND BONDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes grounding and bonding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.
- B. Related Sections include the following:
 - 1. List below only products, construction, and equipment that the reader might expect to find in this Section but are specified elsewhere.
 - 2. Section "Underground Ducts and Utility Structures" for ground test wells.

1.3 SUBMITTALS

- A. Revise this Article to suit Project and office practice. Frequently, no product submittal is required for this Section.
- B. Product Data: For each type of product indicated.
- C. Retain paragraph above if Product Data are required for each product specified. Retain paragraph below if Product Data are required only for selected products.
- D. Product Data: For the following:
 - 1. Ground rods.
 - 2. Chemical rods.
 - 3. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
- E. Field Test Reports: Submit written test reports to include the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.4 QUALITY ASSURANCE

- A. Retain paragraph and subparagraph below if Contractor or manufacturer selects testing agency. Delete if Contractor is allowed to perform ground-resistance testing.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - 1. Comply with UL 467.
- C. Comply with NFPA 70; for overhead-line construction and medium-voltage underground construction, comply with IEEE C2.

- D. Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Retain above for nonproprietary or below for semiproprietary Specification. Refer to Division 1 Section "Materials and Equipment."
- C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. See Editing Instruction No.1 in the Evaluations for cautions about naming products and manufacturers.
 - 2. Grounding Conductors, Cables, Connectors, and Rods:
 - a. Apache Grounding/Erico Inc.
 - b. Boggs, Inc.
 - c. Chance/Hubbell.
 - d. Copperweld Corp.
 - e. Dossert Corp.
 - f. Erico Inc.; Electrical Products Group.
 - g. Framatome Connectors/Burndy Electrical.
 - h. Galvan Industries, Inc.
 - i. Hastings Fiber Glass Products, Inc.
 - j. Ideal Industries, Inc.
 - k. ILSCO.
 - l. Kearney/Cooper Power Systems.
 - m. Korns: C. C. Korns Co.; Division of Robroy Industries.
 - n. Lightning Master Corp.
 - o. Lyncole XIT Grounding.
 - p. O-Z/Gedney Co.; a business of the EGS Electrical Group.
 - q. Raco, Inc.; Division of Hubbell.
 - r. Robbins Lightning, Inc.
 - s. Salisbury: W. H. Salisbury & Co.
 - t. Superior Grounding Systems, Inc.
 - u. Thomas & Betts, Electrical.

2.2 GROUNDING CONDUCTORS

- A. For insulated conductors, comply with Section "Conductors and Cables."
- B. If only copper conductors are permitted in Division 16 Section "Conductors and Cables," delete paragraph below.
- C. Material: copper.
- D. Equipment Grounding Conductors: Insulated with green-colored insulation.
- E. Isolated Ground Conductors: Insulated with green-colored insulation with yellow stripe. On feeders with isolated ground, use colored tape, alternating bands of green and yellow

tape to provide a minimum of three bands of green and two bands of yellow.

- F. Grounding Electrode Conductors: Stranded cable.
- G. Underground Conductors: stranded, unless otherwise indicated.
- H. Sizes and types below are typical. Adjust to suit Project conditions and requirements.
- I. Copper Bonding Conductors: As follows:
 - 1. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, 1/4 inch (6.4 mm) in diameter.
 - 2. Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.
 - 3. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches (42 mm) wide and 1/16 inch (1.5 mm) thick.
 - 4. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 1-5/8 inches (42 mm) wide and 1/16 inch (1.5 mm) thick.
- J. Delete paragraph and subparagraphs below if use of aluminum conductors is not permitted.
- K. Ground Conductor and Conductor Protector for Wood Poles: As follows:
 - 1. No. 4 AWG minimum, soft-drawn copper conductor.
 - 2. Conductor Protector: Half-round PVC or wood molding. If wood, use pressure-treated fir, or cypress or cedar.
- L. Grounding Bus: Bare, annealed copper bars of rectangular cross section, with insulators.

2.3 CONNECTOR PRODUCTS

- A. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.
- B. Bolted Connectors: Bolted-pressure-type connectors, or compression type.
- C. Welded Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.

2.4 GROUNDING ELECTRODES

- A. Copper-clad steel is most common. See Evaluations for discussion on where other materials might be more appropriate.
- B. Ground Rods: Copper-clad steel.
 - 1. Select paragraph above or paragraph and subparagraph below. Sectional types are used when rods longer than 10 feet (3 m) are installed.
 - 2. Size: 3/4 by 120 inches (19 by 3000 mm) in diameter.
- C. Chemical Electrodes: Copper tube, straight or L-shaped, filled with nonhazardous chemical salts, terminated with a 4/0 bare conductor. Provide backfill material recommended by manufacturer.

- D. Test Wells: Provide handholes as specified in Section "Underground Ducts and Utility Structures."

PART 3 - EXECUTION

3.1 APPLICATION

- A. Delete paragraph below if only copper conductors are specified in Division 16 Section "Conductors and Cables."
- B. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.
- C. In raceways, use insulated equipment grounding conductors.
- D. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections, except those at test wells.
- E. Equipment Grounding Conductor Terminations: Use bolted pressure clamps.
- F. Ground Rod Clamps at Test Wells: Use bolted pressure clamps with at least two bolts.
- G. Delete paragraph and subparagraphs below if grounding bus is not required, or edit to suit Project.
- H. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 - 1. Use insulated spacer; space 1 inch (25.4 mm) from wall and support from wall 6 inches (150 mm) above finished floor, unless otherwise indicated.
 - 2. At doors, route the bus up to the top of the door frame, across the top of the doorway, and down to the specified height above the floor.
- I. Edit below to suit Project.
- J. Underground Grounding Conductors: Use tinned copper conductor, No. 2/0 AWG minimum. Bury at least 24 inches (600 mm) below grade or bury 12 inches (300 mm) above duct bank when installed as part of the duct bank.

3.2 EQUIPMENT GROUNDING CONDUCTORS

- A. NEC permits two basic types of equipment grounding conductors: metallic raceway or cable sheath as the conductor, or a separate equipment grounding conductor. The installation of an equipment grounding conductor provides an additional degree of safe operation when compared to relying on raceway as the conductor. Revise paragraphs and subparagraphs in this Article to suit Project.
- B. Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.

- C. Install equipment grounding conductors in all feeders and circuits.
- D. Select paragraph above or paragraph and subparagraphs below.
- E. Install insulated equipment grounding conductor with circuit conductors for the following items, in addition to those required by NEC:
 - 1. Feeders and branch circuits.
 - 2. Lighting circuits.
 - 3. Receptacle circuits.
 - 4. Single-phase motor and appliance branch circuits.
 - 5. Three-phase motor and appliance branch circuits.
 - 6. Flexible raceway runs.
 - 7. Armored and metal-clad cable runs.
- F. Busway Supply Circuits: Install insulated equipment grounding conductor from the grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.
- G. Computer Outlet Circuits: Install insulated equipment grounding conductor in branch-circuit runs from computer-area power panels or power-distribution units.
- H. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate grounding conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.
- I. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate equipment grounding conductor. Isolate equipment grounding conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.
- J. Nonmetallic Raceways: Install an equipment grounding conductor in nonmetallic raceways unless they are designated for telephone or data cables.
- K. Air-Duct Equipment Circuits: Install an equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners and heaters. Bond conductor to each unit and to air duct.
- L. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate

equipment grounding conductor to each electric water heater, heat-tracing, and antifrost heating cable. Bond conductor to heater units, piping, connected equipment, and components.

- M. Coordinate paragraph and subparagraphs below with Drawings and Specification Sections for systems referenced. Edit to suit Project.
- N. Signal and Communication Systems: For telephone, alarm, voice and data, and other communication systems, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
 - 1. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-2-by-12-inch (6.4-by-50-by-300-mm) grounding bus.
 - 2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.
- O. Metal Poles Supporting Outdoor Lighting Fixtures: Provide a grounding electrode in addition to installing a separate equipment grounding conductor with supply branch-circuit conductors.

3.3 INSTALLATION

- A. Ground Rods: Install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes.
 - 1. Drive ground rods until tops are 2 inches (50 mm) below finished floor or final grade, unless otherwise indicated.
 - 2. Interconnect ground rods with grounding electrode conductors. Use exothermic welds, except at test wells and as otherwise indicated. Make connections without exposing steel or damaging copper coating.
- B. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- C. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers and supports is not transmitted to rigidly mounted equipment. Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted clamp. Bond straps directly to the basic structure taking care not to penetrate any adjacent parts. Install straps only in locations accessible for maintenance.

- D. Metal Water Service Pipe: Provide insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes by grounding clamp connectors. Where a dielectric main water fitting is installed, connect grounding conductor to street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
- E. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with grounding clamp connectors.
- F. Bond interior metal piping systems and metal air ducts to equipment grounding conductors of associated pumps, fans, blowers, electric heaters, and air cleaners. Use braided-type bonding straps.
- G. Bond each aboveground portion of gas piping system upstream from equipment shutoff valve.
- H. Install one test well for each service at the ground rod electrically closest to the service entrance. Set top of well flush with finished grade or floor.
- I. Ufer Ground (Concrete-Encased Grounding Electrode): Fabricate according to NFPA 70, Paragraph 250-81(c), using a minimum of 20 feet (6 m) of bare copper conductor not smaller than No. 4 AWG. If concrete foundation is less than 20 feet (6 m) long, coil excess conductor within the base of the foundation. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building grounding grid or to a grounding electrode external to concrete.

3.4 CONNECTIONS

- A. Coordinate paragraph and subparagraphs below with Drawings.
- B. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
 - 1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
 - 2. Make connections with clean, bare metal at points of contact.
 - 3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
 - 4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.

- 5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
- C. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.
- D. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.
- E. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.
- F. Connections at Test Wells: Use compression-type connectors on conductors and make bolted- and clamped-type connections between conductors and ground rods.
- G. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- H. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.
- I. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.5 FIELD QUALITY CONTROL

- A. Retain one of three paragraphs below.
- B. Testing: Perform the following field quality-control testing:
 - 1. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.
 - 2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service

disconnect enclosure grounding terminal, and at ground test wells. Measure ground resistance not less than two full days after the last trace of precipitation, and without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests, by the fall-of-potential method according to IEEE 81.

3. Provide drawings locating each ground rod and ground rod assembly and other grounding electrodes, identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
 - a. NFPA 70 has minimum value of 25 ohms. See Evaluations for discussion on appropriate grounding resistance values. Values listed below are typical; adjust to suit Project conditions.
 - b. Equipment Rated 500 kVA and Less: 10 ohms.

- c. Equipment Rated 500 to 1000 kVA: 5 ohms.
 - d. Equipment Rated More Than 1000 kVA: 3 ohms.
 - e. Substations and Pad-Mounted Switching Equipment: 5 ohms.
 - f. Manhole Grounds: 10 ohms.
4. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

3.6 GRADING AND PLANTING

- A. Delete below if inappropriate or if surface restoration work is covered on Drawings or in Division 2 Sections. Coordinate with Drawings.
- B. Restore surface features, including vegetation, at areas disturbed by Work of this Section. Reestablish original grades, unless otherwise indicated. If sod has been removed, replace it as soon as possible after backfilling is completed. Restore areas disturbed by trenching, storing of dirt, cable laying, and other activities to their original condition. Include application of topsoil, fertilizer, lime, seed, sod, sprig, and mulch. Comply with Section "Landscaping." Maintain restored surfaces. Restore disturbed paving as indicated.

END OF SECTION

**SECTION 26 05 29
HANGERS AND SUPPORTS**

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- A. The General Provisions, Supplemental General Provisions, Special Provisions and Specification sections, apply to work covered by this Section.
- B. Comply with this sections, as applicable. Refer to other sections for coordination of work.

1.2 SCOPE OF WORK

- A. Provide labor, material, equipment, tools and services, and perform operations required for, and reasonably incidental to, the providing of supporting devices, including related systems and accessories.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Unistrut Corp.
- B. B-Line Systems, Inc.
- C. Midland Ross-Kindorf

2.2 MATERIALS

- A. Suspension Hangers
 - 1. Suspension hangers for individual conduit runs shall be zinc plated formed steel type.
- B. Vertical Supports
 - 1. Malleable iron one hole pipe straps shall be used for vertical runs
- C. Clamps
 - 1. Beam clamps shall be used for bar joists and beams.
- D. Anti-Vibration Hangers
 - 1. Anti-vibration hangers shall be combination type having a double deflection neoprene element in series with a steel coil spring; double deflection of 0.30"; steel coil spring shall be selected from a 1" static deflection series with a minimum additional travel to solid of 1/2"; spring diameters shall be large enough to permit 15 degree angular misalignment of the rod connecting the hanger to the ceiling support without rubbing the hanger box.

2.3 LIGHT FIXTURE HANGERS

- A. Refer to Section 26 51 00
- B. Corrosive Areas: PVC; at factory apply a minimum of 10-mil-thick PVC coating, bonded to metal, inside and outside.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Hangers
 - 1. Approved hangers and stiff leg supports shall be installed in quantity and size as required to carry the weight of raceway and contents and shall be arranged to prevent vibration transmission to the building and allow for raceway movement.
 - 2. Hangers shall be supported by means of uncoated solid steel rods which are threaded to allow vertical adjustments. Lock nuts shall be provided in sufficient number and location to lock all rod adjustments permanently at the adjusted height. Two lock nuts shall be used unless the nut tightens against a threaded socket. Minimum rod diameters shall be as follows:
- B. NOMINAL CONDUIT SIZE ROD DIAMETER
 - 1/2" through 2 1/4"
 - 2-1/2" through 3 3/8"
 - 4" and 5 1/2"
 - 1. Hanger spacing shall be as required for proper and adequate support raceway, but in no case shall be less than one hanger per 8'-0" of raceway length except that conduit less than 1" diameter shall be supported at least every 6'-0".
 - 2. Where numerous conduits are run parallel to one another, they may be supported from a trapeze type hanger arrangement with strut bottom.
 - 3. Anti-vibration type hangers shall be provided for equipment as required to minimize vibration and/or as directed by the Architect/Engineer.
- Supports
 - 4. Support of hangers shall be by means of sufficient quantities of individual after set steel expansion shields, or beam clamps attached to structural steel.
 - 5. Stiff-legs shall be furnished and installed in cases where support from overhead structure is not possible.
 - 6. Ceiling mounted lighting fixtures shall be supported from the building structure at two opposite corners. The Contractor shall provide fixture hangers to properly interface with the ceiling system.
 - 7. Furnish and install complete any additional structural support steel, brackets, fasteners, etc., as required to adequately support all raceway and equipment.

8. Support of hangers from concrete slabs shall be by means of sufficient quantity of "U" brackets attached with after set expansion shields and bolts.

9. Support of hangers from concrete tees shall be by means of sufficient quantity of angle iron brackets attached with after set expansion shields and bolts.

END OF SECTION

**SECTION 26 05 33
RACEWAYS AND BOXES**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
1. Edit lists below to suit Project.
 2. Raceways include the following:
 - a. RMC.
 - b. IMC.
 - c. PVC externally coated, rigid steel conduits.
 - d. PVC externally coated, IMC.
 - e. EMT.
 - f. FMC.
 - g. LFMC.
 - h. LFNC.
 - i. RNC.
 - j. ENT.
 - k. Wireways.
 - l. Surface raceways.
 3. Boxes, enclosures, and cabinets include the following:
 - a. Device boxes.
 - b. Floor boxes.
 - c. Outlet boxes.
 - d. Pull and junction boxes.
 - e. Cabinets and hinged-cover enclosures.
- B. Related Sections include the following:
1. List below only products and equipment for this Project that the reader might expect to find in this Section but are specified elsewhere. Verify that Section titles listed below are correct for this Project's Specifications because Section titles may have changed since this Section was updated.
 2. Section "Basic Electrical Materials and Methods" for raceways and box supports.
 3. Section "Wiring Devices" for devices installed in boxes and for floor-box service fittings.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
B. ENT: Electrical nonmetallic tubing.
C. FMC: Flexible metal conduit.

- D. IMC: Intermediate metal conduit.
E. LFMC: Liquidtight flexible metal conduit.
F. LFNC: Liquidtight flexible nonmetallic conduit.
G. RMC: Rigid metal conduit.
H. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Delete below except for custom enclosures.
- C. Shop Drawings: Include layout drawings showing components and wiring for nonstandard boxes, enclosures, and cabinets.

1.5 QUALITY ASSURANCE

- A. Listing and Labeling: Provide raceways and boxes specified in this Section that are listed and labeled.
1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.
 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.
- B. Comply with NECA's "Standard of Installation."
- C. Comply with NFPA 70.

1.6 COORDINATION

- A. Coordinate layout and installation of raceways and boxes with other construction elements to ensure adequate headroom, working clearance, and access.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Retain above for nonproprietary or below for semiproprietary Specification. Refer to Division 1 Section "Materials and Equipment."

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

1. Metal Conduit and Tubing:
 - a. Alfex Corp.
 - b. Anamet, Inc.; Anaconda Metal Hose.
 - c. Anixter Brothers, Inc.
 - d. Carol Cable Co., Inc.
 - e. Cole-Flex Corp.
 - f. Electri-Flex Co.
 - g. Flexcon, Inc.; Coleman Cable Systems, Inc.
 - h. Grinnell Co.; Allied Tube and Conduit Div.
 - i. Monogram Co.; AFC.
 - j. Spiraduct, Inc.
 - k. Triangle PWC, Inc.
 - l. Wheatland Tube Co.
2. Nonmetallic Conduit and Tubing:
 - a. Anamet, Inc.; Anaconda Metal Hose.
 - b. Aruco Corp.
 - c. Breeze-Illinois, Inc.
 - d. Cantex Industries; Harsco Corp.
 - e. Certainteed Corp.; Pipe & Plastics Group.
 - f. Cole-Flex Corp.
 - g. Condux International; Electrical Products.
 - h. Electri-Flex Co.
 - i. George-Ingraham Corp.
 - j. Hubbell, Inc.; Raco, Inc.
 - k. Lamson & Sessions; Carlson Electrical Products.
 - l. R&G Sloan Manufacturing Co., Inc.
 - m. Spiraduct, Inc.
 - n. Thomas & Betts Corp.
3. Conduit Bodies and Fittings:
 - a. Aluminum conduits NOT ACCEPTABLE.
 - b. American Electric; Construction Materials Group.
 - c. Crouse-Hinds; Div. of Cooper Industries.
 - d. Emerson Electric Co.; Appleton Electric Co.
 - e. Hubbell, Inc.; Killark Electric Manufacturing Co.
 - f. Lamson & Sessions; Carlson Electrical Products.
 - g. O-Z/Gedney; Unit of General Signal.
 - h. Scott Fetzer Co.; Adalet-PLM.
 - i. Spring City Electrical

Manufacturing Co.

4. Metal Wireways:

- a. Hoffman Engineering Co.
- b. Keystone/Rees, Inc.
- c. Square D Co.

2.2 METAL CONDUIT AND TUBING

- A. Rigid Steel Conduit: ANSI C80.1.
- B. Rigid Aluminum Conduit: ANSI C80.5.
- C. IMC: ANSI C80.6.
- D. EMT and Fittings: ANSI C80.3.
 1. Fittings: steel compression type.
- E. Fittings: NEMA FB 1; compatible with conduit/tubing materials.

2.3 NONMETALLIC CONDUIT AND TUBING

- A. RNC: NEMA TC 2, Schedule 40 or 80 PVC.
- B. RNC Fittings: NEMA TC 3; match to conduit or conduit/tubing type and material.
- C. LFNC: UL 1660.

2.4 METAL WIREWAYS

- A. Material: Sheet metal sized and shaped as indicated.
- B. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- C. Select features, unless otherwise indicated, as required to complete wiring system and to comply with NFPA 70.
- D. Select 1 of 4 paragraphs below.
- E. Wireway Covers: Screw – cover type flanged-and-gasketed type.
- F. Finish: Manufacturer's standard enamel finish.

2.5 OUTLET AND DEVICE BOXES

- A. Sheet Metal Boxes: NEMA OS 1.
- B. Edit paragraph below. Aluminum is also available and suitable for use with steel raceways.
- C. Cast-Metal Boxes: NEMA FB 1, Type FD, cast box with gasketed cover.

2.6 PULL AND JUNCTION BOXES

- A. Small Sheet Metal Boxes: NEMA OS 1.
- B. Cast-Metal Boxes: NEMA FB 1, cast aluminum with gasketed cover.

2.7 ENCLOSURES AND CABINETS

- A. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 2. Nonmetallic Enclosures: Plastic, finished inside with radio-frequency-resistant paint.
- B. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage, and include accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive raceways, boxes, enclosures, and cabinets for compliance with installation tolerances and other conditions affecting performance of raceway installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 WIRING METHODS

- A. Use a comprehensive wiring method schedule on Drawings or use this Article to specify where various raceway types are to be installed. Edit examples below, adding or deleting materials and methods to suit Project. Coordinate with Division 16 Section "Wires and Cables." Do not duplicate information on Drawings, in NFPA 70, or in other Division 16 Sections. List exceptions to stated requirements. Check code to avoid specifying uses not permitted.
- B. Minimum sizes required: Unless larger conduit sizes are required by NEC, are shown on drawings or are required by the Work itself, provide the following minimum size conduits:
- a. Above grade: ¾"
 - b. Below grade: 2"
- C. Outdoors: Use the following wiring methods:
1. Exposed: Rigid threaded hot-dipped galvanized steel. Do not use thread-less fittings.
 2. Concealed: Rigid steel.
 3. Underground, Single Run: Sch 40(heavy wall) PVC. All elbows for

- service entrance conduits are to be long-radius type.
4. Underground, Grouped: Sch 40(heavy wall) PVC. All elbows for service entrance conduits are to be long-radius type..
 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC rated for outdoors.
 6. Boxes and Enclosures: NEMA 250, Type 3R .
- D. Indoors: Use the following wiring methods:
1. Exposed: Hot dip galvanized EMT with steel compression fittings.
 2. Concealed: Hot dip galvanized EMT with steel compression fittings.
 3. Underground, Single Run: Sch 40(heavy wall) PVC. All elbows for service entrance conduits are to be long-radius type..
 4. Underground, Grouped: Sch 40(heavy wall) PVC. All elbows for service entrance conduits are to be long-radius type..
 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC; except in wet or damp locations, use LFMC.
 6. Damp or Wet Locations: Rigid steel conduit.
 7. Boxes and Enclosures: NEMA 250, Type 1, except as follows:
 - a. Select 1 of 2 subparagraphs below and add other specific box and enclosure requirements to suit Project.
 - b. Damp or Wet Locations: NEMA 250, Type 4, stainless steel.

3.3 INSTALLATION

- A. Install raceways, boxes, enclosures, and cabinets as indicated, according to manufacturer's written instructions.
- B. Select paragraph above or below.
- C. Minimum Raceway Size: 3/4-inch trade size (DN21).
- D. Conceal conduit and EMT, unless otherwise indicated, within finished walls, ceilings, and floors.

- E. Keep raceways at least **6 inches (150 mm)** away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- F. Install raceways level and square and at proper elevations. Provide adequate headroom.
- G. Complete raceway installation before starting conductor installation.
- H. Support raceways as specified in Section "Basic Electrical Materials and Methods."
- I. Use temporary closures to prevent foreign matter from entering raceways.
- J. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portion of bends is not visible above the finished slab.
- K. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.
- L. Use raceway fittings compatible with raceways and suitable for use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings, unless otherwise indicated.
- M. Run concealed raceways, with a minimum of bends, in the shortest practical distance considering the type of building construction and obstructions, unless otherwise indicated.
- N. Raceways Embedded in Slabs (Must be indicated on drawings to be embedded. Please notify Engineer if required but not shown): Install in middle third of slab thickness where practical, and leave at least **1-inch (25-mm)** concrete cover.
 - 1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
 - 2. Space raceways laterally to prevent voids in concrete.
 - 3. Run conduit larger than **1-inch trade size (DN27)** parallel to or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
 - 4. Transition from nonmetallic tubing to Schedule 80 nonmetallic conduit, rigid steel conduit, or IMC before rising above floor.
- O. Install exposed raceways parallel to or at right angles to nearby surfaces or structural members, and follow the surface contours as much as practical.
 - 1. Run parallel or banked raceways together, on common supports where practical.
 - 2. Make bends in parallel or banked runs from same centerline to make bends parallel. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.
- P. Join raceways with fittings designed and approved for the purpose and make joints tight.
 - 1. Make raceway terminations tight. Use bonding bushings or wedges at connections subject to vibration. Use bonding jumpers where joints cannot be made tight.
 - 2. Use insulating bushings to protect conductors.
- Q. Terminations: Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against the box. Where terminations are not secure with 1 locknut, use 2 locknuts: 1 inside and 1 outside the box.
- R. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align raceways so the coupling is square to the box and tighten the chase nipple so no threads are exposed.
- S. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel or monofilament plastic line with not less than **200-lb (90-kg)** tensile strength. Leave at least **12 inches (300 mm)** of slack at each end of the pull wire.
- T. Telephone and Signal System Raceways, **2-Inch Trade Size (DN53)** and Smaller: In addition to the above requirements, install raceways in maximum lengths of **150 feet (45 m)** and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.
- U. Delete paragraph below if not applicable.

- V. Install raceway sealing fittings according to manufacturer's written instructions. Locate fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
1. Where conduits pass from warm to cold locations, such as the boundaries of refrigerated spaces.
 2. Where otherwise required by NFPA 70.
- W. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with the finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used **6 inches (150 mm)** above the floor. Install screwdriver-operated, threaded flush plugs flush with floor for future equipment connections.
- X. Flexible Connections: Use maximum of **6 feet (1830 mm)** of flexible conduit for recessed and semirecessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use liquidtight flexible conduit in wet or damp locations. Install separate ground conductor across flexible connections.
- Y. Delete paragraph below if no high-frequency installation.
- Z. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in a nonmetallic sleeve.
- AA. Do not install aluminum conduits embedded in or in contact with concrete.
- BB. PVC Externally Coated, Rigid Steel Conduits: Use only fittings approved for use with that material. Patch all nicks and scrapes in PVC coating after installing conduits.
- CC. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying the raceways to receptacle or fixture ground terminals.
1. Select each surface raceway outlet box, to which a lighting fixture is attached, of sufficient diameter to provide a seat for the fixture canopy.
 2. Where a surface raceway is used to supply a fluorescent lighting fixture having central-stem suspension with a backplate and a canopy (with or without extension ring), no separate outlet box is required.
 3. Provide surface metal raceway outlet box, and the backplate and canopy, at the feed-in location of each fluorescent lighting fixture having end-stem suspension.
 4. Where a surface metal raceway extension is made from an existing outlet box on which a lighting fixture is installed, no additional surface-mounted outlet box is required. Provide a backplate slightly smaller than the fixture canopy.
- DD. Set floor boxes level and adjust to finished floor surface.
- EE. Select paragraph above for metal floor boxes and below for nonmetallic floor boxes.
- FF. Set floor boxes level and trim after installation to fit flush to finished floor surface.
- GG. Install hinged-cover enclosures and cabinets plumb. Support at each corner.
- HH. NO PVC CONDUIT ALLOWED ABOVE THE CEILING OR IN THE A/C RETURN PLENUM. PROVIDE RIGID CONDUIT. Verify all MEP documents.**
- ### 3.4 PROTECTION
- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure coatings, finishes, and cabinets are without damage or deterioration at the time of Substantial Completion.
1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.
- ### 3.5 CLEANING

A. On completion of installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and

construction debris and repair damaged finish, including chips, scratches, and abrasions.

END OF SECTION

**SECTION 26 05 53
ELECTRICAL IDENTIFICATION**

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

- A. The General Provisions, Supplemental General Provisions, Special Provisions and Specification sections, apply to work covered by this Section.
- B. Comply with ELECTRICAL Sections, as applicable. Refer to other sections for coordination of work.

1.2 SCOPE OF WORK

- A. Provide labor, material, equipment, tools and services, and perform operations required for, and reasonably incidental to, the providing of electrical identification, including related accessories.
- B. Provide electrical identification for the following:
 - 1. Panelboards, motor starters, contactors, disconnect switches, circuit breakers and other electrical equipment with nameplate identifying the item of equipment and the equipment serving the same.
 - 2. Raceways, junction boxes and pull boxes.
 - 3. Label each panelboard index indicating the room #s to the related circuit. Also add the index sheet in a laminated white core, plastic with beveled edges, minimum 1/16 inch thick. Lettering shall be machine-engraved, not less than 1/4" high, cut through the black or red surface to the white core.
 - 4. Wiring devices.
 - 5. Wiring.
 - 6. Three phase motor rotation.

1.3 SUBMITTALS

- A. Submit product data in accordance with Section for products specified under PART 2 - PRODUCTS.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Brady
- B. Panduit
- C. Thomas & Betts
- D. Seton

2.2 IDENTIFICATION

- A. Nameplates
 - 1. Nameplates shall be black engraved surface on white core for normal power circuits and red engraved surface on white core for emergency power circuits.
 - 2. Provide for each distribution panelboard, branch circuit panelboard, transformer and any other similar equipment furnished under this section identification as to its given name, voltage and origination of service. Examples are as follows:

'LR1'

'LR2'

120/240V
FED FROM 'MDP'

120/240V
FED FROM 'MDP'

- 3. Provide for each motor starter enclosure, circuit breaker enclosure, disconnect switch and any other similar equipment furnished under this section, identification as to the specific load that it serves and the origination of service. Examples are as follows:

'AHU-1'
FED FROM 'MDP'

'CU-1'
FED FROM 'MDP'

- 4. Provide for each feeder protective device in each distribution panelboard and any other similar equipment furnished under this section, identification as to the specific load that it serves.
- 5. Nameplates shall be laminated, white core, plastic with beveled edges, minimum 1/16 inch thick. Lettering shall be machine-engraved, not less than 1/4" high, cut through the black or red surface to the white core.
- B. Junction Boxes and Pull Boxes
 - 1. Identification shall be with a black permanent marking pen on the top of 4" x 4" junction box covers or on the back of an outlet box cover plate identifying the branch circuits and systems within the conduit. Pull boxes shall be provided with a nameplate stating voltage and system served.
- C. Wiring Device Wall Plates
 - 1. On the back side of wiring device wall plates identify with a black permanent marking pen the panelboard and branch circuit number the device is served from.
- D. Wire Markers
 - 1. Wire markers for identification of wiring shall be self-adhesive type having letters and numerals indicating serving equipment and feeder or branch circuit number.
- E. Rotation Tags
 - 1. Rotation tags shall be brass or aluminum securely attached to equipment.

PART 3 EXECUTION

3.1 PREPARATION

- A. Surfaces to receive labels or nameplates shall be carefully prepared in accordance with the manufacturer's instructions and recommendations.

3.2 NAMEPLATES

- A. Nameplates shall be properly attached to identify panelboards, feeder circuit breakers,

disconnect switches, pull boxes and other similar equipment furnished under this section.

3.3 WIRE MARKERS

- A. Wire markers shall be applied to each conductor or cable within panelboards, motor starter enclosures, circuit breaker enclosures,

disconnect switches, cabinets, junction boxes, pull boxes, and other similar equipment identifying the serving equipment and feeder or branch circuit from which the conductors originate.

END OF SECTION

SECTION 26 09 26
LIGHTING CONTROL SYSTEM

1.1 GENERAL SUMMARY

A. RELATED SECTIONS

- i. Drawings and provisions necessary for any contractual agreement, including the following section(s)

1.2 DEFINITIONS

- A. BAS: Building Automation System
- B. IP: Internet protocol
- C. Monitoring: Acquisition, processing, communication, and display of equipment status data, metered electrical parameter values, power quality evaluation data, event alarm signals, tabulated reports, and event logs.
- D. RS-485: A serial network protocol, similar to RS-232, complying with TIA-485-A

1.3 SYSTEM DESCRIPTION

A. DESIGN PERFORMANCE REQUIREMENTS

- i. System shall have an architecture that is based upon three main concepts; 1) intelligent lighting control devices 2) stand-alone lighting control zones 3) network backbone for remote or time based operation.
- ii. Intelligent lighting control devices shall consist of one or more basic lighting control components: occupancy sensors, photocell sensors, relays, dimming outputs, manual switch stations, and manual dimming stations. Combining one or more of these components into a single device enclosure should be permissible so as to minimize overall device count of system.
- iii. System must interface directly with intelligent LED luminaires such that only CAT-5e cabling is required to interconnect luminaires with control components such as sensors and switches (see Networked LED Luminaire section)
- iv. Intelligent lighting control devices shall communicate digitally, require <4 mA of current to function (Graphic wall stations excluded), and possess RJ-45 style connectors.
- v. Lighting control zones shall consist of one or more intelligent lighting control components, be capable of stand-alone operation, and be capable of being connected to a higher level network backbone.
- vi. Devices within a lighting control zone shall be connected with CAT-5e low voltage cabling in any order.
- vii. Lighting control zone shall be capable of automatically configuring itself for default

operation without any start-up labor required.

- viii. Individual lighting zones must continue to provide a user defined default level of lighting control in the event of a system communication failure with the backbone network or the management software becoming unavailable.
- ix. Power for devices within a lighting control zone shall come from either resident devices already present for switching (relay device) or dimming purposes, or from the network backbone. Standalone "bus power supplies" shall not be required in all cases.
- x. All switching and dimming for a specific lighting zone shall take place within the devices located in the zone itself (i.e. not in a remotely located devices such as panels) to facilitate system robustness and minimize wiring requirements. Specific applications that require centralized or remote switching shall be capable of being accommodated.
- xi. System shall have one or more primary wall mounted network control "gateway" devices that are capable of accessing and controlling connected system devices and linking into an Ethernet LAN.
- xii. System shall use "bridge" devices that route communication and distribute power for up to 8 directly connected lighting zones together for purposes of decreasing system wiring requirements.
- xiii. System shall have a web-based software management program that enables remote system control, status monitoring, and creation of lighting control profiles.
- xiv. Individual lighting zones shall be capable of being segmented into several "local" channels of occupancy, photocell, and switch functionality for more advanced configurations and sequences of operation.
- xv. Devices located in different lighting zones shall be able to communicate occupancy, photocell, and switch information via either the wired or Wi-Fi backbone.
- xvi. System shall be capable of operating a lighting control zone according to several sequences of operation. System shall be able to change a spaces sequence of operation according to a time schedule so as to enable customized time-of-day, day-of-week utilization of a space. Note operating modes should be utilized only

in manners consistent with local energy codes.

1. Auto-On / Auto-Off (via occupancy sensors)
 - a. Zones with occupancy sensors automatically turn lights on when occupant is detected.
 - b. Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.
 - c. Pressing a switch will turn lights off. The lights will remain off regardless of occupancy until switch is pressed again, restoring the sensor to Automatic On functionality.
2. Manual-On / Auto-Off (also called Semi-Automatic)
 - a. Pushing a switch will turn lights on.
 - b. Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.
3. Manual-On to Auto-On/Auto-Off
 - a. Pushing a switch will turn lights on.
 - b. After initial lights on, zones with occupancy and/or photocell sensors turn lights on/off according to occupancy/vacancy and/or daylight conditions.
 - c. Sequence can be reset via scheduled (ex. daily each morning) events
4. Auto-to-Override On
 - a. Zones with occupancy sensors automatically turn lights on when occupant is detected.
 - b. Zone lighting then goes into an override on state for a set amount of time or until the next time event returns the lighting to an auto-off style of control.
 - c. Sequence can be reset via scheduled (ex. daily each morning) events
5. Manual-to-Override On
 - a. Pushing a switch will turn lights on.
 - b. Zone lighting then goes into an override on state for a set amount of time or until the next time event returns the lighting to an auto-off style of control.

- c. Sequence can be reset via scheduled (ex. daily each morning) events
6. Auto On / Predictive Off
 - a. Zones with occupancy sensors automatically turn lights on when occupant is detected.
 - b. Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.
 - c. If switch is pressed, lights turn off and a short "exit timer" begins. After timer expires, sensor scans the room to detect whether occupant is still present. If no occupancy is detected, zone returns to auto-on. If occupancy is detected, lights must be turned on via the switch.
7. Multi-Level Operation (multiple lighting levels per manual button press)
 - a. Operating mode designed specifically for bi-level applications
 - b. Enables the user to cycle through the up to four potential on/off lighting states using only a single button.
 - c. Eliminates user confusion as to which of two buttons controls which load
 - d. Mode available as a setting on all nLight devices that have single manual on/off switch (ex. nWSX, nPODM, nPODM-DX).
 - e. In addition to achieving bi-level lighting control by switching loads with relays, the ability to command dimming outputs to "step" in a sequence that achieves bi-level operation is present.
 - f. A taskbar style desktop application shall be available for personal lighting control.
 - g. An application that runs on "smart" handheld devices (such as an Apple® iPhone®) shall be available for personal lighting control.
 - h. Control software shall enable logging of system performance data and presenting useful information in a web-based

- graphical format and downloadable to .CSV files.
- i. Control software shall enable integration with a BMS via BACnet IP.
- j. System shall provide the option of having pre-terminated plenum rated CAT-5e cabling supplied with hardware.

1.4 SUBMITTALS

- A. Product Datasheets (general device descriptions, dimensions, wiring details, nomenclature)
- B. Riser Diagrams – typical per room type (detailed drawings showing device interconnectivity of devices)
- C. Other Diagrams – as needed for special operation or interaction with other system(s)
- D. Example Contractor Startup/Commissioning Worksheet – must be completed prior to factory start-up
- E. Hardware and Software Operation Manuals
- F. Other operational descriptions as needed
- G. Owner Training Documentation
- H. Contractor Installation Training Documentation

1.5 QUALITY ASSURANCE

- A. NEMA Compliance: All system components shall comply with all applicable portions of NEMA standards pertaining to types of electrical equipment and enclosures.
- B. UL Approval: All applicable equipment shall be tested to and listed under UL standard 508 and shall bear labels to indicate compliance. System listed by ETL or under other UL sections shall provide documentation proving compliance with UL standard 508 and/or 916 as applicable.
- C. NEC Compliance: All system components shall comply with all applicable sections of the National Electrical Code (NEC) as required.
- D. All steps in sensor manufacturing process shall occur in the USA; including population of all electronic components on circuit boards, soldering, programming, wiring, and housing.
- E. All components and the manufacturing facility where product was manufactured must be ROHS compliant.
- F. In high humidity or cold environments, the sensors shall be conformably coated and rated for condensing humidity and -40 degree Fahrenheit (and Celsius) operation.
- G. All applicable products must be UL / CUL Listed or other acceptable national testing organization.

1.6 COORDINATION

- A. Coordinate lighting control components to form an integrated interconnection of compatible components.
- B. Coordinate lighting controls with BAS (if necessary) either through IP based intercommunication of system or hardwired auxiliary relay outputs.
- C. The installing contractor shall be responsible for a complete and functional system in accordance with all applicable local and national codes.

1.7 WARRANTY

- A. All devices in lighting control system shall have a 5 year warranty.

1.8 PRODUCTS

- A. APPROVED MANUFACTURERS
 - i. The following manufacturers have been approved and will be allowed to bid, provided the submittal clearly indicates the design criteria and performance of specifications indicated in Lighting Control System Specification 26.00.00
 - 1. **nLight® Lighting Control System from Sensor Switch**, an Acuity Brands Company
 - ii. **nLight Network Control System** from Sensor Switch is the basis of design.
 - iii. All other manufacturers not listed will require (2) sets of a side by side comparison noting any deviation from product specified in their submittal documentation submitted to the engineer (7) days prior to bid date. The specifying engineer must approve any proposed substitutions in writing by addendum. The document requirements may include, but are not limited to, the following:
 - 2. Full layout and design of each control area clearly mapping every individual device necessary for a complete working system.
 - 3. Wiring and delineation of all parts and devices
 - 4. Submittal riser diagrams with specification sheets and instruction sheets for all devices in the system proposed

1.9 INDIVIDUAL DEVICE SPECIFICATION

- A. Control Module (Gateway)
 - i. Control module shall be a device that facilitates communication and time-based control of downstream network devices and linking into an Ethernet.

- ii. Devices shall have a user interface that is capable of wall mounting, powered by low voltage, and have a touch screen.
 - iii. Control device shall have three RJ-45 ports for connection to other backbone devices (bridges) or directly to lighting control devices.
 - iv. Device shall automatically detect all devices downstream of it.
 - v. Device shall have a standard and astronomical internal time clock.
 - vi. Device shall have one RJ-45 10/100 Base T Ethernet connection.
 - vii. Device shall have a USB port
 - viii. Each control gateway device shall be capable of linking 1500 devices to the management software.
 - ix. Device shall be capable of using a dedicated or DHCP assigned IP address.
 - x. Network Control Gateway device shall be the following Sensor Switch model Series: **nGWY2**
- B. System Occupancy Sensors**
- i. Occupancy sensors system shall sense the presence of human activity within the desired space and fully control the on/off function of the lights.
 - ii. Sensors shall utilize passive infrared (PIR) technology, which detects occupant motion, to initially turn lights on from an off state; thus preventing false on conditions. Ultrasonic based sensing technologies shall not be accepted.
 - iii. For applications where a second method of sensing is necessary to adequately detect maintained occupancy (such as in rooms with obstructions), a sensor with an additional "dual" technology shall be used.
 - iv. Dual technology sensors shall have one of its two technologies not require motion to detect occupancy. Acceptable dual technology includes PIR/Microphonics (also known as Passive Infrared/Automatic Gain Control Technology or PDT) which both looks for occupant motion and listens for sounds indicating occupants.
 - v. All sensing technologies shall be acoustically passive meaning they do not transmit sounds waves of any frequency (for example in the Ultrasonic range), as these technologies have the potential for interference with other electronic devices within the space (such as electronic white board readers). Acceptable detection technologies include Passive Infrared (PIR), and/or Microphonics technology.
 - vi. Sensors shall be available with zero, one, or two integrated Class 1 switching relays, and up to one 0-10 VDC dimming output.
- Sensors shall be capable of switching 120 / 277 / 347 VAC. Load ratings shall be 800 W @ 120 VAC, 1200 W @ 277 VAC, 1500 W @ 347 VAC, and ¼ HP motor. Relays shall be dry contacts.
- vii. Sensors shall be available with one or two occupancy "poles", each of which provides a programmable time delay.
 - viii. Sensors shall be available in multiple lens options which are customized for specific applications.
 - ix. Communication and Class 2 low voltage power shall be delivered to each device via standard CAT-5e low voltage cabling with RJ-45 connectors.
 - x. All sensors shall have the ability to detect when it is not receiving valid communication (via CAT-5e connections) and blink its LED in a pattern to visually indicate of a potential wiring issue
 - xi. Every sensor parameter shall be available and configurable remotely from the software and locally via the device push-button.
 - xii. Sensors shall be able to function together with other sensors in order to provide expanded coverage areas by simply daisy-chain wiring together the units with CAT-5e cabling.
 - xiii. Sensors shall be equipped with an automatic override for 100 hour burn-in of fluorescent lamps. This feature must be available at any time for lamp replacements.
 - xiv. Wall switch sensors shall recess into single-gang switch box and fit a standard GFI opening.
 - xv. Wall switch sensors must meet NEC grounding requirements by providing a dedicated ground connection and grounding to mounting strap. Line and load wire connections shall be interchangeable. Sensor shall not allow current to pass to the load when sensor is in the unoccupied (Off) condition.
 - xvi. Wall switch sensors shall have optional features for photocell/daylight override, vandal resistant lens, and low temperature/high humidity operation.
 - xvii. Wall switch sensors shall be available in four standard colors (Ivory, White, Light Almond, Gray)
 - xviii. Wall switch sensors shall be available with optional raise/lower dimming adjustment controls
 - xix. Wall switch sensors shall be the following Sensor Switch model numbers, with device color and optional features as specified:

- xx. **LV** (Dual Tech w/ Night Light, No Relay, Raise/Lower Dim Ctrl)
 - xxi. Network system shall also have ceiling, fixture, recessed, & corner mounted sensors available.
 - xxii. Fixture mount sensors shall be capable of powering themselves via a line power feed.
 - xxiii. Sensors shall have optional features for photocell/daylight override, dimming control, and low temperature/high humidity operation.
 - xxiv. Sensors with dimming can control 0 to 10 VDC dimmable ballasts by sinking up to 20 mA of Class 2 current (typically 40 or more ballasts).
- C. System Daylight (Photocell and or Dimming) Sensors
- i. Photocell shall provide for an on/off set-point, and a dead-band to prevent the artificial light from cycling. Delay shall be incorporated into the photocell to prevent rapid response to passing clouds.
 - ii. Photocell and dimming sensor's set-point and dead-band shall be automatically calibrated through the sensor's microprocessor by initiating an "Automatic Set-point Programming" procedure. Min and max dim settings as well as set-point may be manually entered.
 - iii. Dead-band setting shall be verified and modified by the sensor automatically every time the lights cycle to accommodate physical changes in the space (i.e., furniture layouts, lamp depreciation, or lamp outages).
 - iv. Dimming sensors shall control 0 to 10 VDC dimmable ballasts by sinking up to 20 mA of class 2 current (typically 40 or more ballasts).
 - v. Photocell and dimming sensors shall be equipped with an automatic override for 100 hour burn-in of lamps. This feature must be available at any time for lamp replacements. (Note: This function should be performed prior to any dimming of the lamps including the "auto set-point" setting.)
 - vi. Combination units that have all features of on/off photocell and dimming sensors shall also be available.
 - vii. A dual zone option shall be available for On/Off Photocell, Automatic Dimming Control Photocell, or Combination units. The second zone shall be capable of being controlled as an "offset" from the primary zone.
 - viii. Line voltage versions of the above described photocell and combination photocell/dimming sensors shall be capable of switching both 120 VAC, 277 VAC, and 347 VAC. Load ratings shall be 800 W @ 120 VAC, 1200 W @ 277 VAC, 1500 W @ 347 VAC, and ¼ HP motor load. Relays shall be dry contacts.
- ix. Sensor shall be the following Sensor Switch model numbers, with device options as specified: Refer to plans.
- Note: Recessed mount versions of the above ceiling(fixture) mount versions also shall be available (e.g. nCMR(B) PC => nRMR PC)
- D. System Power (Relay) Packs
- i. Power Pack shall incorporate one or more Class 1 relays and contribute low voltage power to the rest of the system. Secondary Packs shall incorporate the relay(s), shall have an optional 2nd relay, 0-10 VDC dimming output, or line voltage dimming output, but shall not be required to contribute system power. Power Supplies shall provide system power only, but are not required to switch line voltage circuit. Auxiliary Relay Packs shall switch low voltage circuits only.
 - ii. Power Packs shall accept 120 or 277 VAC (or optionally 347 VAC), be plenum rated, and provide Class 2 power to the system.
 - iii. All devices shall have two RJ-45 ports.
 - iv. Every Power Pack parameter shall be available and configurable remotely from the software and locally via the device push-button.
 - v. Power Pack shall securely mount to junction location through a threaded ½ inch chase nipple or be capable of being secured within a luminaire ballast channel. Plastic clips into junction box shall not be accepted. All Class 1 wiring shall pass through chase nipple into adjacent junction box without any exposure of wire leads. Note: UL Listing under Energy Management or Industrial Control Equipment automatically meets this requirement, whereas Appliance Control Listing does not meet this safety requirement.
 - vi. When required by local code, Power Pack must install inside standard electrical enclosure and provide UL recognized support to junction box. All Class 1 wiring is to pass through chase nipple into adjacent junction box without any exposure of wire leads.
 - vii. Specific Secondary Packs shall be available that provide up to 5 Amps of switching and can dim 120 VAC incandescent lighting loads or 120/277

- VAC line voltage dimmable fluorescent ballasts (2-wire and 3-wire versions).
- viii. Specific Secondary Packs shall be available that provide up to 5 Amps of switching and can dim 120/277 VAC magnetic low voltage transformers.
- ix. Specific Secondary Packs shall be available that provide up to 4 Amps of switching and can dim 120 VAC electronic low voltage transformers.
- x. Specific Secondary Packs shall be available that require a manual switch signal (via a networked Wall Station) in order to close its relay.
- xi. Specific Power/Secondary Packs shall be available that are UL924 listed for switching of Emergency Power circuits.
- xii. Specific Secondary Packs shall be available that control louver/damper motors for skylights.
- xiii. Specific Secondary Packs shall be available that provide a pulse on/pulse off signal for purposes of controlling shade systems via relay inputs.
- xiv. Power (Relay) Packs and Supplies shall be the following Sensor Switch model Series:
 - xv. **nPP16** (Power Pack w/ 16A relay)
 - xvi. **nPP16 D** (Power Pack w/ 16A relay and 0-10VDC dimming output)
 - xvii. **nSP16** (Secondary Pack w/ 16A relay)
 - xviii. **nPP16 ER** (UL924 Listed Secondary Pack w/ 16A relay for switching emergency power circuits)
 - xix. **nSP5 PCD 2W** (Secondary Pack w/ 5A relay and incandescent dimming or 2-wire line voltage fluorescent dimming output)
 - xx. **nSP5 PCD 3W** (Secondary Pack w/ 5A relay and 3-wire line voltage fluorescent dimming output)
 - xxi. **nSP5 PCD MLV** (Secondary Pack w/ 5A relay and magnetic low voltage dimming output)
 - xxii. **nSP5 PCD ELV 120** (Secondary Pack w/ 4A relay and electronic low voltage dimming output)
 - xxiii. **nPS 80** (Auxiliary Bus Power Supply)
- E. System Relay & Dimming Panels
 - i. Panel shall incorporate up to 8 normally closed latching relays capable of switching 120/277 VAC or up to 2 Dual Phase relays capable of switching 208/240/480 VAC loads.
 - ii. Relays shall be rated to switch up to a 30A ballast load at 277 VAC.
 - iii. Panel shall provide one 0-10VDC dimming output paired with each relay.
 - iv. Panel shall power itself from an integrated 120/277 VAC supply.
 - v. Panel shall be capable of operating as either two networked devices or as one.
- vi. Panel shall supply current limited low voltage power to other networked devices connected via CAT-5e.
- vii. Panel shall provide auxiliary low voltage device power connected wired directly to a dedicated terminal connection
- viii. Power (Relay) Packs and Supplies shall be the following Sensor Switch model numbers:
 - ix. **nPANEL 8** (Panel w/ four 120/277 VAC relays and four 0-10 VDC dimming outputs)
- F. Networked Auxiliary Input / Output (I/O) Devices
 - i. Devices shall be plenum rated and be inline wired, screw mountable, or have an extended chase nipple for mounting to a ½" knockout.
 - ii. Devices shall have two RJ-45 ports
 - iii. Communication and low voltage power shall be delivered to each device via standard CAT-5e low voltage cabling with RJ-45 connectors.
 - iv. Specific I/O devices shall have a dimming control output that can control 0-10 VDC dimmable ballasts or LED drivers by sinking up to 20 mA of current (typically 40 or more ballasts).
 - v. Specific I/O devices shall have an input that read a 0-10 VDC signal from an external device.
 - vi. Specific I/O devices shall have a switch input that can interface with either a maintained or momentary switch and run a switch event, run a local/remote control profile, or raise/lower a dimming output
 - vii. Specific I/O devices shall sense state of low voltage outdoor photocells
 - viii. Specific I/O devices shall enable RS-232 communication between lighting control system and Touch Screen based A/V control systems.
 - ix. Specific I/O devices shall sense.
 - x. Auxiliary Input/Output Devices shall be the following Sensor Switch model numbers:
 - xi. **nIO D** (I/O device with 0-10 dimming output)
 - xii. **nIO 1S** or **nIO RLX** (I/O device with contact closure or 0-10VDC dimming input)
 - xiii. **nIO NLI** (Input device for detecting state of low voltage outdoor photocell; sold in **nIO PC KIT** only)
 - xiv. **nIO X** (Interface device for communicating with RS-232 enabled AV Touch Screens
- G. System Wall Switches & Dimmers

- i. Devices shall recess into single-gang switch box and fit a standard GFI opening.
- ii. Devices shall be available with zero or one integrated Class 1 switching relay.
- iii. Communication and low voltage power shall be delivered to each device via standard CAT-5e low voltage cabling with RJ-45 connectors.
- iv. All sensors shall have two RJ-45 ports.
- v. All devices shall provide toggle switch control. Dimming control and low temperature/high humidity operation are available options.
- vi. Devices shall be available in four colors (Ivory, White, Light Almond, Gray).
- vii. Devices with dimming control outputs can control 0-10 VDC dimmable ballasts by syncing up to 20 mA of current (typically 40 or more ballasts).
- viii. Devices with capacitive touch buttons shall provide audible user feedback with different sounds for on/off, raise/lower, start-up, and communication offline.
- ix. Devices with mechanical push-buttons shall provide tactile and LED user feedback.
- x. Devices with mechanical push-buttons shall be made available with custom button labeling
- xi. Devices with a single on button shall be capable of selecting all possible lighting combinations for a bi-level lighting zone such that the user confusion as to which of two buttons (as is present in multi-button scenarios) controls which load is eliminated.
- xii. Wall switches and dimmers shall be the following Sensor Switch model numbers, with device options as specified:
- xiii. **nPODM** (single on/off, push-buttons, LED user feedback)
- xiv. **nPODM DX** (single on/off, single dimming raise/lower, push-buttons, LED user feedback)
- xv. **nPODM 2P DX** (dual on/off, dual dimming raise/lower, push-buttons, LED user feedback)
- xvi. **nPODM 4P DX** (quad on/off, quad dimming raise-lower, push-buttons, LED user feedback)
- H. Communication Bridges
 - i. Device shall surface mount to a standard 4" x 4" square junction box.
 - ii. Device shall have 8 RJ-45 ports.
 - iii. Device shall be capable of aggregating communication from multiple lighting control zones for purposes of minimizing backbone wiring requirements back to Control Gateway.
- iv. Device shall be powered with Class 2 low voltage supplied locally via a directly wired power supply or delivered via a CAT-5e cabled connection.
- v. Device shall be careful of redistributing power from its local supply and connect lighting control zones with excess power to lighting control zones with insufficient local power. This architecture also enables loss of power to a particular area to be less impactful on network lighting control system.
- vi. Communication Bridge devices shall be the following Sensor Switch model numbers:
- vii. **nBRG 8** (8 Ports)

1.10 LIGHTING CONTROL PROFILES

- A. Changes to the operation of the system shall be capable of being made in real-time or scheduled via lighting control profiles. These profiles are outlines of settings that direct how a collection of devices function for a defined time period.
- B. Lighting control profiles shall be capable of being created and applied to a single device, zone of devices, or customized group of zones.
- C. All relays and dimming outputs shall be capable of being scheduled to track or ignore information regarding occupancy, daylight, and local user switches via lighting control profiles.
- D. Every device parameter (e.g. sensor time delay and photocell set-point) shall be configurable via a lighting control profile.
- E. All lighting control profiles shall be stored on the network control gateway device and on the software's host server.
- F. Lighting control profiles shall be capable of being scheduled to run according to the following calendar options: start date/hour/minute, end date/hour/minute, and sunrise/sunset +/- timed offsets.
- G. Sunrise/sunset times shall be automatically derived from location information using an astronomical clock.
- H. Daylight savings time adjustments shall be capable of being performed automatically, if desired.
- I. Lighting control profile schedules shall be capable of being given the following recurrence settings: daily, weekday, weekend, weekly, monthly, and yearly.
- J. Software shall provide a graphical tool for easily viewing scheduled lighting control profiles.

1.11 MANAGEMENT SOFTWARE

- A. Every device parameter (e.g. sensor time delay and photocell set-point) shall be available and configurable remotely from the software
- B. The following status monitoring information shall be made available from the software for all devices for which it is applicable: current occupancy status, current PIR Status, current Microphonics Status, remaining occupancy time delay(s), current photocell reading, current photocell inhibiting state, photocell transitions time remaining, current dim level, device temperature, and device relay state(s).
- C. The following device identification information shall be made available from the software: model number, model description, serial number, manufacturing date code, custom label(s), and parent network device.
- D. A printable network inventory report shall be available via the software.
- E. A printable report detailing all system profiles shall be available via the software.
- F. Software shall require all users to login with a User Name and Password.
- G. Software shall provide at least three permission levels for users.
- H. All sensitive stored information and privileged communication by the software shall be encrypted.
- I. All device firmware and system software updates must be available for automatic download and installation via the internet.
- J. Software shall be capable of managing systems interconnected via a WAN (wide area network)

1.12 BMS COMPATIBILITY

- A. System shall provide a BACnet IP gateway as a downloadable software plug-in to its management software. No additional hardware shall be required.
- B. BACnet IP gateway software shall communicate information gathered by networked system to other building management systems.
- C. BACnet IP gateway software shall translate and forward lighting relay and other select control commands from BMS system to networked control devices.

1.13 Pre-construction Jobsite Visit

- A. Pre-construction On-site Services
- B. Project electrical contractor/distributor shall contact Spectrum Lighting – San Antonio to schedule jobsite meeting prior to the beginning of the installation of the lighting

- control system. Purpose of the meeting is to review installation documentation provided by the system manufacturer and submittals. Discussion should include wiring conventions and specific wiring requirements. Installation of specific devices are also to be addressed.
- C. Purpose is to review any questions regarding the installation of the lighting control system by the installing contractor.
- D. Prior to commissioning Spectrum Lighting field service technical shall visit the jobsite to confirm progress and answer any additional questions. Commissioning date is to be confirmed at the time of this visit. Training agenda shall be provided to the contractor/distributor. Contractor/distributor shall confirm owner representative and specifying engineer attendance at lighting system demonstration and/or for training. Contractor/distributor shall provide to field service technician programming information as required for commissioning to include zone assignments, time schedules for operation, presets for all control stations, programming sequences for dynamic LED fixtures, emergency operation, blink warn, and system override. Programming information is required for system set-up and pre-commissioning.
- E. Lighting Control System Commissioning and Training
- F. Prior to energizing lighting control system the following must be completed:
- G. No component of the lighting control system shall be energized prior to a factory certified field service engineer has approved the installation of the system by the project electrical contractor. Failure to have a factory certified field service technician approve the installation and commission the system will relieve the manufacturer of the lighting control equipment of all responsibility relating to damaged parts or warranty. The electrical contractor/distributor shall contact Spectrum Lighting at least 3 weeks prior to the requested commissioning date to schedule a field service engineer to be at the jobsite. Request shall be in writing and shall include filled out commissioning request form and dated jobsite photos of the dimmer and/or relay panels.
- H. Lighting Control system is defined as the dimmer/relay panel(s) and all associated control stations and related accessories.
- I. The electrical contractor is responsible to install the entire lighting control system, all power feeders, all load wiring, and control wiring. Equipment shall be installed

according to the manufacturer's instructions, contract documents, and national and local codes and regulations.

- J. Equipment shall be plumb and level to the finished floor. All components of the lighting control system shall be clean, free of dust and paint spatters. Components shall be unmarred or damaged. All cable shall be dressed, neatly routed, and labeled. All conduit shall be securely attached to the dimmer/relay panel.
- K. Commissioning
Each dimmer/relay panels shall be individually tested with the connected load as designed. Each dimmer/relay should be tested with its connected load as specified.
- L. Each dimmer/relay shall be tested by the electrical contractor (with a multi-meter) to confirm what voltage is being passed and to confirm that no voltage is being passed when the circuit is open.
- M. A representative of the owner shall be present to observe the testing/demonstration of the dimmer/relay panels. Each individual dimmer/relay panel shall be load tested with all circuits on while under load for a minimum of 1 hour.
- N. Where external devices are to be attached to the dimmer/relay panel including photocell, occupancy sensor, time clock, and/or control stations, operation of each device should be verified at the panel and specific circuits that are programmed to be controlled by the external device(s).
- O. Where control signals originate from the dimmer/relay panel for control of lighting fixtures, the control signal shall be tested by the electrical contractor to confirm that it is being delivered to each lighting fixture. Proper operation of the lighting fixtures shall be confirmed as part of the system testing/demonstration.
- P. Training :
Training shall be provided for the owner's representative and contractor. Prior to commissioning owner's representative and electrical contractor/distributor shall acknowledge receipt of training agenda. Electrical contractor/distributor shall confirm that specifying engineer has been contacted and been invited to attend the system demonstration and/or training. All product and lighting control system documentation and operation's manuals shall be provided by electrical contractor/distributor at the time of training.

- Q. Training is to include, but not be limited to: basic operation of lighting control system, set-up of system and control panels, operation of control stations, programming of system, basic be-bugging, and overall system testing. At completion of training session all in attendance shall sign the commissioning technician's field service report to confirm participation in the training session.
- R. Completed field service report shall be submitted to the electrical contractor/distributor and specifying engineer.
- S. Follow-up Contact
Approximately 90 days following the commissioning of the lighting control system Spectrum Lighting shall contact the electrical contractor/distributor/owner to confirm that the system is operating correctly and answer any operational questions that have come-up since commissioning.
- T. Warranty Review and Follow-up Visit
Approximately 300 days following commissioning of the lighting control system Spectrum Lighting shall contact the owner's representative who attended the system demonstration and training and electrical contractor/distributor to schedule a visit to the jobsite. Visit shall be scheduled so that testing of the lighting control system and related equipment can be conducted without disturbing normal operation of the jobsite. In attendance should be owner's representative and contractor.
- U. The lighting control system shall be demonstrated to confirm operation. All system programming shall be confirmed and when necessary adjusted to meet the set-up or current requirements. When programming needs to be adjusted the new system configuration files shall be forwarded by the field service technician to the system manufacturer, as required. Copies can be provided to owner's representative upon request. Any questions regarding operation of the system shall be addressed at this time.
- V. Any lighting control equipment that is not operating as defined by the specification shall be repaired or replaced at the discretion of the field service technician. Projected dates for completion of all changes will be included in the follow-up report. All system changes and updates shall be documented by the field service technician and provided in a written report to the owner's representative, contractor, and specifying engineer.

1.14 EXECUTION AND INSTALLATION

- A. Refer to all recommendations set forth by the manufacturer
- B. Preparation
 - i. Contractor shall provide a set of floor plan drawings, and shall coordinate with the manufacturer / manufacturer's representative the necessary electronic documents necessary to lay out the drawings
- C. It is the manufacturer's responsibility to select the appropriate type of sensor for each room, under the following constraints:
 - i. Provide sensors in all spaces required by current IECC. Provide dual technology occupancy sensors in all bathrooms.
 - ii. It will be the contractor's / manufacturer's responsibility to provide the quantity of sensors required for complete and proper coverage in the control area. Sensors shall be able to detect single or multiple occupants in the room. The contractor shall decide the most effective way to

- run low voltage wiring, while adhering to manufacturer's layout recommendations
- iii. Adjustments to sensors may be done at the room level, or remote via Sensor View software
- iv. Install low voltage lighting control devices only in electrical boxes that are clean, free from debris, excess building material, and similar matter.
- D. Wiring
 - i. All branch circuit wiring shall be installed in approved raceway
 - ii. Low voltage wiring shall be installed in approved raceway where concealed in inaccessible locations or exposed. Where the low voltage wiring is concealed in accessible ceiling plenums, it may, to the Contractor's option, be routed without a raceway using air, plenum-rated multi-conductor cable. All control wiring shall be minimum 18 AWG stranded copper.
 - iii. All low voltage wiring shall be color coded and identified or tagged at terminations to assist with future maintenance.

END OF SECTION

SECTION 26 21 17
SITE ELECTRICAL

PART1 -GENERAL

1.1 RELATED REQUIREMENTS

- A. The General Provisions, Supplemental General Provisions, Special Provisions and Specification sections, apply to work covered by this Section.

1.2 SCOPE OF WORK

- A. Provide labor, materials, equipment, tools and services, and perform operations required for, and reasonably incidental to, the providing of all site electrical work.
- B. The site electrical work shall include, but not be limited to, the furnishing and installation of necessary materials and making arrangements for:
 - 1. The connection of electrical and telephone utilities.
 - 2. Underground conduit.

1.3 SUBMITTALS

- A. Submit product data and shop drawings in accordance with Section for products specified under PARTS 2 PRODUCTS.

1.4 REFERENCE STANDARDS

- A. National Electrical Code (NEC), Article 300
- B. Service installation standards of the serving utility company(s).

PART 2 PRODUCTS

2.1 ELECTRICAL SERVICE

- A. Coordination: The location of the service entrance shall be coordinated with all other trades. Provide materials and equipment required to connect the electrical service. Contractor shall coordinate with the Power Company for all requirements prior to bid date. Contractor shall include all cost to for Utility Company to extend service to project site bid.
- B. Materials: Provide materials in accordance with other Sections of these Specifications.

2.2 COMMUNICATION SERVICE

- A. Coordination: The location of the telephone, cable, and internet service entrance shall be coordinated with all other trades. Provide materials and equipment required to connect the telephone, cable and internet services. Contractor shall coordinate with the Telephone , cable, and internet company for all requirements prior to bid date. Contractor is responsible to coordinate with utility companies.
- B. Materials: Provide materials in accordance with other sections of

this specification.

PART 3 EXECUTION

3.1 GENERAL

- A. Underground installation of more than one conduit shall be in a duct arrangement as indicated. All conduits shall be laid so joints are staggered. All bends and stub-ups shall be rigid steel.
- B. Pour a red colored concrete envelope 3" thick over utility service, emergency generator and fire pump conduits. Where conduits cross a driveway, road or parking area, reinforcing rods shall be installed.
- C. Perform excavation, shoring, backfilling and concrete work in connection with electrical work in accordance with other sections of the Specifications.
- D. All conduit shall be sloped away from the building to negate water entering the building through the conduit system.

3.2 UTILITIES

- A. The locations, elevations and voltage of electrical lines and the location of the telephone lines included within the area of this work are indicated on the Drawings or in the Specifications in accordance with information received by the Architect/Engineer and Owner.
- B. The Contractor shall examine the site and shall verify, to his own satisfaction, the location and elevation of all utilities, and shall adequately inform himself as to their relation to the work.
- C. Existing utility lines not indicated but encountered during construction shall be protected, relocated or capped as directed by the Architect/Engineer. All precautions shall be exercised to prevent damage to existing lines not shown, but should work become necessary, it must be authorized prior to execution except in an emergency situation.
- D. Before beginning excavations of any nature whatsoever, the Contractor shall make an attempt to locate all underground utilities of every nature occurring within the bounds of the area to be excavated. Contractor is responsible to call 811 prior to any work. The Contractor shall then proceed with caution in his excavation work so that no utility shall be damaged with a resultant loss of service.
- E. Should a damage result to any utility through the Contractor's negligence or

failure to comply with the above directive, he shall be liable for such damage and for all expense incurred in the expeditious repair or replacement of such damaged utilities.

- F. Repair of damaged utilities shall be to a

condition equal to or better than the adjacent undamaged portion of such utility and to the complete satisfaction of the Architect/Engineer and Owner.

END OF SECTION

SECTION 26 24 16
PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes load centers and panelboards, overcurrent protective devices, and associated auxiliary equipment rated 600 V and less for the following types:
 - 1. Edit panelboards below to suit Project.
 - 2. Lighting and appliance branch-circuit panelboards.
 - 3. Distribution panelboards.
- B. Related Sections include the following:
 - 1. List below only products, construction, and equipment that the reader might expect to find in this Section but are specified elsewhere.
 - 2. Retain subparagraph below if Project includes fusible panelboards.
 - 3. Section "Fuses."

1.3 DEFINITIONS

- A. Retain abbreviations that remain after this Section has been edited.
- B. EMI: Electromagnetic interference.
- C. GFCI: Ground-fault circuit interrupter.
- D. RFI: Radio-frequency interference.
- E. RMS: Root mean square.
- F. SPDT: Single pole, double throw.
- G. TVSS: Transient voltage surge suppressor.

1.4 SUBMITTALS

- A. Product Data: For each type of panelboard, overcurrent protective device, TVSS device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.
 - 1. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:
 - a. Enclosure types and details for types other than NEMA 250, Type 1.
 - b. Bus configuration, current, and voltage ratings.
 - c. Short-circuit current rating of panelboards and overcurrent protective devices.
 - d. Delete subparagraph below if series rating of overcurrent protective devices is not used.

- e. UL listing for series rating of installed devices.
 - f. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
 - 2. Wiring Diagrams: Diagram power, signal, and control wiring and differentiate between manufacturer-installed and field-installed wiring.
- C. Delete paragraph below if independent testing agency is not used.
- D. Qualification Data: Submit data for testing agencies indicating that they comply with qualifications specified in "Quality Assurance" Article.
- E. Field Test Reports: Submit written test reports and include the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- F. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.
- G. Maintenance Data: For panelboards and components to include in maintenance manuals specified in other sections. In addition to requirements specified in Section "Contract Closeout," include the following:
 - 1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
 - 2. Time-current curves, including selectable ranges for each type of overcurrent protective device.

1.5 QUALITY ASSURANCE

- A. Retain paragraph and subparagraph below if Contractor or manufacturer selects testing agency.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NEMA PB 1.
- D. Comply with NFPA 70.

1.6 COORDINATION

- A. Edit below to delete or add types of equipment that affect panelboard installation.
- B. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, and encum-

brances to workspace clearance requirements.

1.7 EXTRA MATERIALS

- A. Extra materials may not be allowed for publicly funded projects. Revise quantity below to suit Project.
- B. Keys: [SIX] 6 spares of each type of panelboard cabinet lock.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Retain above for nonproprietary or below for semiproprietary Specification. Refer to Division 1 Section "Materials and Equipment."
- C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Lists below are examples only. Retain or insert only those manufacturers whose products correspond with other requirements and whose availability and suitability for the application have been verified.
 - 2. Panelboards, Overcurrent Protective Devices, Controllers, Contactors, and Accessories:
 - a. Eaton
 - b. Square D Co.
 - c. General Electric
 - d. Siemens

2.2 FABRICATION AND FEATURES

- A. Enclosures: Flush- and surface-mounted cabinets. NEMA PB 1, Type 1, to meet environmental conditions at installed location.
 - 1. Delete items below if not applicable. Add other Project-specific requirements.
 - 2. Outdoor Locations: NEMA 250, Type 3R.
 - 3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
 - 4. Enclosures in hazardous locations must be carefully selected to meet the division and group listing of the environment.
 - 5. Hazardous Areas Indicated on Drawings: NEMA 250, Type 7C.
- B. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
- C. Retain paragraph above or below.
- D. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
- E. Finish: Manufacturer's standard enamel finish over corrosion-resistant treatment or primer coat.

- F. Directory Card: With transparent protective cover, mounted inside metal frame, inside panelboard door.
- G. Bus: Hard-drawn copper, 98 percent conductivity.
- H. Main and Neutral Lugs: Copper mechanical type suitable for use with conductor material.
- I. Ten paragraphs below are special features. Add other required features and coordinate with Drawings.
- J. Equipment Ground Bus: Copper and adequate for feeder and branch-circuit equipment ground conductors; bonded to box.
- K. Delete paragraph below except for panelboards incorporating one or more main service disconnect switches. Edit to suit Project.
- L. Service Equipment Label: UL labeled for use as service equipment for panelboards with main service disconnect switches.
- M. Delete paragraph below if future provisions are not required.
- N. Isolated Equipment Ground Bus: Copper and adequate for branch-circuit equipment ground conductors; insulated from box.
- O. Extra-Capacity Neutral Bus: Copper neutral bus rated 200 percent of phase bus and UL listed as suitable for nonlinear loads.
- P. Split Bus: Vertical buses divided into individual vertical sections.
- Q. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
- R. Gutter Barrier: Arrange to isolate individual panel sections.
- S. Column-Type Panelboards: Narrow gutter extension, with cover, to overhead junction box equipped with ground and neutral terminal buses.
- T. Feed-through Lugs: Copper mechanical type suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.

2.3 PANELBOARD SHORT-CIRCUIT RATING

- A. Select one of two paragraphs below for series-rated system or system that has panelboards and circuit breakers rated for full value of short-circuit current available at location of equipment. Edit to suit Project and coordinate with Drawings.
- B. Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Branch Overcurrent Protective Devices: Plug-in or bolt on circuit breakers, replaceable without disturbing adjacent units.
- B. Coordinate below with Drawings.
- C. Doors: Front mounted with concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.5 DISTRIBUTION PANELBOARDS

- A. Edit three paragraphs and associated subparagraphs below to suit Project. Coordinate with Drawings.
- B. Doors: Front mounted, except omit in fused-switch panelboards; secured with vault-type latch with tumbler lock; keyed alike.
- C. Main Overcurrent Protective Devices: Circuit breaker.
- D. Branch overcurrent protective devices shall be one of the following:
 - 1. For Circuit-Breaker Frame Sizes 125 A and Smaller: Plug-in or Bolt-on circuit breakers.
 - 2. For Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.

2.6 OVERCURRENT PROTECTIVE DEVICES

- A. Edit three paragraphs and associated subparagraphs below to suit Project. Coordinate with schedules and Drawings.
- B. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.
 - 1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 - 2. Electronic Trip Unit Circuit Breakers: RMS sensing; field-replaceable rating plug; with the following field-adjustable settings:
 - a. Instantaneous trip.
 - b. Long- and short-time pickup levels.
 - c. Long- and short-time time adjustments.
 - d. Ground-fault pickup level, time delay, and I²t response.
 - 3. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
 - 4. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker; trip activation on fuse opening or on opening of fuse compartment door.
 - 5. GFCI Circuit Breakers: Single- and two-pole configurations with [5] [30]-mA trip sensitivity.
- C. Molded-Case Circuit-Breaker Features and Accessories. Standard frame sizes, trip ratings, and number of poles.
 - 1. Lugs: Mechanical style, suitable for number, size, trip ratings, and material of conductors.
 - 2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.

- 3. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.

- D. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Install panelboards and accessories according to NEMA PB 1.1.
- B. Mounting Heights: Top of trim 74 inches (1880 mm) above finished floor, unless otherwise indicated.
- C. Mounting: Plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish.
- D. Revise paragraph below if "Balancing Loads" Paragraph is deleted from "Field Quality Control" Article below.
- E. Circuit Directory: Create a directory to indicate installed circuit loads after balancing panelboard loads. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
- F. Install filler plates in unused spaces.
- G. Revise below if "Balancing Loads" Paragraph is deleted from "Field Quality Control" Article below.
- H. Wiring in Panelboard Gutters: Arrange conductors into groups and bundle and wrap with wire ties after completing load balancing.

3.2 IDENTIFICATION

- A. Select Division 16 Section "Basic Electrical Materials and Methods" for projects with simple requirements and Division 16 Section "Electrical Identification" for projects with complex requirements.
- B. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Section "Basic Electrical Materials and Methods" [Electrical Identification].
- C. Panelboard Nameplates: Label each panelboard with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

3.3 CONNECTIONS

- A. Coordinate paragraphs below with Drawings.
- B. Install equipment grounding connections for panelboards with ground continuity to main electrical ground bus.
- C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

- A. Prepare for acceptance tests as follows:
 - 1. Test insulation resistance for each panel-board bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- B. Testing: After installing panelboards and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
 - 1. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- C. Balancing Loads: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes as follows:
 - 1. Measure as directed during period of normal system loading.

- 2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data-processing, computing, transmitting, and receiving equipment.
- 3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
- 4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

3.5 ADJUSTING

- A. Set field-adjustable switches and circuit-breaker trip ranges.

3.6 CLEANING

- A. On completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION

**SECTION 26 27 17
EQUIPMENT WIRING**

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- A. The General Provisions, Supplemental General Provisions, Special Provisions and Specification sections, apply to work covered by this Section.
- B. Comply with Electrical Sections, as applicable. Refer to other Sections for coordination of work.
- C. The furnishing and installation of control power wiring required for equipment furnished under HVAC sections and not shown on the electrical drawings shall be furnished under HVAC Sections. Control power wiring is defined as the line voltage (120V) power wiring for equipment control cabinets, temperature control, energy management, or building automation system panels and line voltage smoke/fire dampers. Provide 120V to equipment control devices. Coordinate with HVAC sections prior to rough-ins.
- D. The furnishing and installation of the temperature control wiring, energy management system or building automation wiring not shown on the electrical drawings shall be furnished under HVAC sections. Temperature control, energy management system and building automation system wiring is defined as the interlock or interconnecting wiring required between system control devices, appurtenances and control panels to allow the system to function automatically. This includes wiring between the fire alarm system, smoke exhaust systems, door entry systems and any other system requiring interface with the temperature control, energy management and building automation system.

1.2 SCOPE OF WORK

- A. Provide labor, materials, equipment, tools and services, and perform operations required for, and reasonably incidental to, the providing of power wiring to each motor-driven and/or electrically-operated system or unit of equipment.
- B. Provide labor, materials, equipment, tools and services, and perform operations required for, and reasonably incidental to, the providing of the line voltage wiring serving power to a motor(s) or piece of electric powered equipment. The wiring shall allow the motor(s) or equipment to operate in a manual mode.
- C. All control wiring above the ceiling or in the A/C return plenum shall be plenum rated

cable.

- D. Provide labor, materials, equipment, tools and services and perform operations required for, and reasonably incidental to, the providing of control wiring for miscellaneous systems. The Contractor shall be responsible for reviewing the project specifications to ascertain the extent of the control wiring required for the miscellaneous systems and shall assume the responsibility for performing the work.
- E. Provide labor, materials, equipment, tools and services, and perform operations required for and reasonably incidental to, the providing of a fully connected and operating smoke damper installation. Coordinate with the mechanical contractor th required work. The following is a description of the responsibilities for the specified system:
 - 1 The mechanical contractor will provide the smoke dampers and actuators as indicated in the specifications and on the plans. In addition, if the smoke dampers have pneumatic actuators, the mechanical contractor will provide all control air piping from a source to each smoke damper and the electro-pneumatic (EP) and/or pneumatic-electric (PE) switches as required for actuation of the smoke dampers.
 - 2 The electrical contractor shall provide the power wiring for the smoke damper actuators.
 - 3 The fire alarm contractor shall provide the signal and control wiring for the operation of the smoke dampers including all wiring of EP and/or PE switches.

PART 2 - PRODUCTS

1.3 MATERIALS

- A. Materials and equipment provided hereinafter shall comply with other Electrical Sections and with HVAC/Plumbing Specifications.

PART 3 - EXECUTION

1.4 MOTORS

- A. Except for items that are furnished with factory-installed, integral motors, an electric motor of required size and electrical characteristics will be provided and installed as specified in Section HVAC for each item of motor-driven equipment. As part of the work of this Section, complete the electrical installation of these motors in accordance with approved wiring diagrams and instructions.

- B. Where disconnect switches or circuit breakers are not provided integral with control equipment for motors and other electrical appurtenances, provide and install all disconnect switches required by the National Electrical Code and/or as indicated on the Drawings.

1.5 SYSTEM, EQUIPMENT AND DEVICE WIRING

- A. Connect complete for operation all items of heating, ventilation, air conditioning, plumbing, fire protection and all electrical systems, equipment and devices furnished by the Owner or specified in other sections of the Specifications. System, equipment and device outlets of various types have been indicated in the Specifications or on the drawings, but indication of exact location or scope of the work may not be

indicated. Refer to the Owner and to the work specified in the other sections for the scope of connections to the equipment furnished by them and for the exact locations of all connections to the equipment furnished by them. Power wiring shall be provided under Electrical sections as indicated. Control wiring not indicated to be provided under Electrical sections shall be provided by the provider of the system, equipment, or device and installed and terminated under Electrical sections. Request all rough-in drawings required for proper installation of the electrical work in ample time to permit preparation of the installation drawings and thus avoid delays on the job.

END OF SECTION

SECTION 26 27 26
WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes receptacles, connectors, switches, and finish plates.

1.3 DEFINITIONS

- A. Retain abbreviations that remain after this Section has been edited for Project.
- B. GFI: Ground-fault circuit interrupter.
- C. TVSS: Transient voltage surge suppressor.

1.4 SUBMITTALS

- A. Product Data: For each product specified.
- B. Shop Drawings: Legends for receptacles and switch plates.
- C. Include sample review below if products may have critical features needing hands-on appraisal.
- D. Samples: For devices and device plates for color selection and evaluation of technical features.
- E. Maintenance Data: For materials and products to include in maintenance manuals specified in other sections.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- B. Comply with NEMA WD 1.
- C. Comply with NFPA 70.

1.6 COORDINATION

- A. Delete paragraph below unless receptacles for Owner-Furnished equipment with plugs have unknown configurations.
- B. Receptacles for Owner-Furnished Equipment: Match plug configurations.
- C. Coordinate with pool contractor for special receptacles.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Wiring Devices:
 - a. Hubbell, Inc.;HBL series Wiring Devices Div.
 - b. Or equal

2.2 RECEPTACLES

- A. Select one of three paragraphs below to specify grade of receptacles. See Editing Instruction No. 3 in the Evaluations for wiring device grades.
- B. Straight-Blade and Locking Receptacles: Heavy-Duty grade. The device shall be 20-ampere, 125-volts, Nema configuration 5-20R, back and side wired.
- C. Special Receptacles for NEMA configuration refer to Manufacturer specs.
- D. Termination-type GFCI unit may be substituted for feed-through type where no protection of downstream receptacles is required.
- E. GFI Receptacles: Feed-through type, with integral NEMA WD 6, Configuration 5-20R duplex receptacle arranged to protect connected downstream receptacles on same circuit. Design units for installation in a 2-3/4-inch- (70-mm-) deep outlet box without an adapter. Device shall have an indicator light. Equal to Hubbell GF series. Feeding downstream more than one receptacle from a single GFI receptacle is not acceptable.
- F. Isolated-Ground Receptacles: Equipment grounding contacts connected only to the green grounding screw terminal of the device with inherent electrical isolation from mounting strap. **Device shall be white finish with the orange symbol.**
 - 2. Devices: Listed and labeled as isolated-ground receptacles.
 - 3. Isolation Method: Integral to receptacle construction and not dependent on removable parts.

2.3 SWITCHES

- A. General
 - 1. Switches shall be 20Amp heavy duty specification grade equal to Hubbell HBL series. The body of the switch shall be made of an arc-resistant thermoset material.
 - 2. Switches shall be SPST, DPST, 3-way or 4-way as indicated on the Drawings.
 - 3. Switch color shall be selected by owner. Coordinate with Architect.
- B. Specification Grade
 - 1. Specification Grade switches shall be toggle type. The contact arms shall be made of one-piece copper alloy material. The switch shall include a green ground screw attached to the mounting strap. The switch shall be 20-ampere, 120/277-volts AC, horsepower rated, back and side-wired.
- C. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on/off switches

and audible and electromagnetic noise filters.

1. Modify subparagraph below to suit preference.
2. Control: Continuously adjustable slide, toggle, or rotary knob. Single-pole or three-way switch to suit connections.
3. Incandescent Lamp Dimmers: Modular, 120 V, 60 Hz with continuously adjustable slide with "on/off" switch; single pole with soft tap or other quiet switch; electromagnetic filter to eliminate noise, RF, and TV interference; and 5-inch (130-mm) wire connecting leads. Dimmer to be sized per circuit load.

2.4 WALL PLATES(All wall plates)

- A. For all single and combination types match corresponding wiring devices.
4. Plate-Securing Screws: Metal with head color to match plate finish.
5. Device plates: High-impact smooth nylon equal to Hubbell P8 series. Color finish shall be selected by owner. Coordinate with Architect.

2.5 FLOOR SERVICE FITTINGS

- A. Items in this Article are available for telephone and data cable service as well as power. Edit to suit Project.
- B. Select one of three paragraphs below.
- C. Power Receptacle: NEMA WD 6, Configuration 5-20R, gray finish, unless otherwise indicated.
- D. Signal Outlet: Blank cover with bushed cable opening, unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install devices and assemblies plumb and secure.
- B. Install wall plates when painting is complete.
- C. Install wall dimmers to achieve indicated rating after derating for ganging as instructed by manufacturer.
- D. Do not share neutral conductor on load side of dimmers.
- E. Coordinate two paragraphs below with Drawings.
- F. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

- G. Protect devices and assemblies during painting.
- H. Adjust locations at which floor service outlets and telephone/power service poles are installed to suit arrangement of partitions and furnishings.
- I.

3.2 IDENTIFICATION

- A. Comply with Section "Electrical Identification."
- B. Select paragraph above or below.
- C. Comply with Section "Basic Electrical Materials and Methods."
 1. Switches: Where three or more switches are ganged, and elsewhere as indicated, identify each switch with approved legend engraved on wall plate.
 2. Receptacles: Identify panelboard and circuit number from which served. Use machine-printed, pressure-sensitive, abrasion-resistant label tape on face of plate and durable wire markers or tags within outlet boxes.

3.3 CONNECTIONS

- A. Select paragraph above or below. Coordinate with Division 16 Section "Grounding."
- B. Connect wiring device grounding terminal to branch-circuit equipment grounding conductor.
- C. Isolated-Ground Receptacles: Connect to isolated-ground conductor routed to designated isolated equipment ground terminal of electrical system.
- D. Tighten electrical connectors and terminals according to manufacturers published torque-tightening values. If manufacturers torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

- A. Test wiring devices for proper polarity and ground continuity. Operate each device at least six times.
- B. Dparagraph below if GFCIs are not in Part 2.
- C. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.
- D. Replace damaged or defective components.

3.5 CLEANING

- A. Internally clean devices, device outlet boxes, and enclosures. Replace stained or improperly painted wall plates or devices.

END OF SECTION

SECTION 26 28 13

FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Fuses.

1.3 SUBMITTALS

- A. Use this Article to convey basic design intent. Delete if Drawings show sufficient detail to clarify intent.
- B. General: Submit each item in this Article according to the Conditions of the Contract and Specification Sections.
- C. Product Data for each fuse type specified.
- D. Select above or below. Data listed in paragraph below are appropriate where selective coordination is necessary.
- E. Field test reports indicating and interpreting test results.
- F. Maintenance data for tripping devices to include in the operation and maintenance manual specified in other sections.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain fuses from one source and by a single manufacturer.
- B. Comply with NFPA 70 for components and installation.
- C. Listing and Labeling: Provide fuses specified in this Section that are listed and labeled.
 - 1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.
 - 2. Subparagraph below is required by some Federal agencies.
 - 3. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

1.5 EXTRA MATERIALS

- A. Extra materials may not be allowed for publicly funded projects.
- B. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
 - 1. Spare Fuses: Furnish quantity equal to 20 percent of each fuse type and size installed, but not less than 1 set of 3 of each type and size.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering fuses that may be incorporated into the Work include, but are not limited to, the following:
- B. Retain above for nonproprietary or below for semiproprietary Specification. Refer to Division 1 Section "Materials and Equipment."
- C. Manufacturers: Subject to compliance with requirements, provide fuses by one of the following:
 - 1. See Editing Instruction No. 1 in the Evaluations for cautions about naming products and manufacturers.
 - 2. Cooper Industries, Inc.; Bussmann Div.
 - 3. Eagle Electric Mfg. Co., Inc.
 - 4. Ferraz Corp.
 - 5. General Electric Co.; Wiring Devices Div.
 - 6. Gould Shawmut.
 - 7. Tracor, Inc.; Littelfuse, Inc. Subsidiary.

2.2 CARTRIDGE FUSES

- A. Characteristics: NEMA FU 1, nonrenewable cartridge fuse; class as specified or indicated; current rating as indicated; voltage rating consistent with circuit voltage.

2.3 SPARE FUSE CABINET

- A. Cabinet: Wall-mounted, 0.05-inch-(1.27-mm-) thick steel unit with full-length, recessed piano-hinged door with key-coded cam lock and pull.
 - 1. Size: Adequate for orderly storage of spare fuses specified with 15 percent spare capacity minimum.
 - 2. Finish: Gray, baked enamel.
 - 3. Identification: Stencil legend "SPARE FUSES" in 1-1/2-inch (40-mm) letters on door.
 - 4. Fuse Pullers: For each size fuse.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine utilization equipment nameplates and installation instructions to verify proper fuse locations, sizes, and characteristics.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

- A. Select and edit paragraphs below. Add paragraphs as Project requires to specify fuse applications rather than show them on Drawings.

- B. Motor Branch Circuits: Class RK1, time delay.
- C. Other Branch Circuits: Class RK5, non-time delay.

3.3 INSTALLATION

- A. Install fuses in fusible devices as indicated. Arrange fuses so fuse ratings are readable without removing fuse.

- B. Install spare fuse cabinet where indicated.

3.4 IDENTIFICATION

- A. Install typewritten labels on inside door of each fused switch to indicate fuse replacement information.

END OF SECTION

**SECTION 26 28 18
ENCLOSED SWITCHES**

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

- A. The General Provisions, Supplemental General Provisions, Special Provisions and Specification sections, apply to work covered by this Section.

1.2 SCOPE OF WORK

- A. Provide labor, materials, equipment, tools and services, and perform operations required for, and reasonably incidental to, the providing of disconnect switches, including all related systems and accessories.

1.3 SUBMITTALS

- A. Submit product data and shop drawings in accordance with other Sections for products specified under PART 2 - PRODUCTS.
- B. Provide outline drawings with dimensions, and equipment ratings for voltage, amperage, horsepower and short circuit.
- C. Provide designations for each disconnect. RE: to section 16075.

1.4 REFERENCE STANDARDS

- A. Switches shall be manufactured in accordance with the following standards:
 - 1. UL 98 - Enclosed and Dead Front Switches
 - 2. NEMA KS1 - Enclosed Switches
 - 3. NEMA 250 - Enclosures for Electrical Equipment

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Eaton
- B. Square D Co.
- C. General Electric
- D. Siemens

2.2 GENERAL

- A. Switches shall be heavy duty type.

2.3 SWITCH INTERIOR

- A. Switches shall have switch blades which are visible when the switch is OFF and the cover is open.
- D. Lugs shall be copper and front removable and UL listed for 60°C or 75°C conductors 30-100 ampere, 75°C conductors 200 ampere and up.
- E. Current carrying parts shall be plated to resist corrosion.
- F. Switches shall have removable arc suppressor to facilitate easy access to line side lugs.
- G. Switches shall have provisions for a field installable electrical interlock.

2.4 SWITCH MECHANISM

- A. Switch operating mechanism shall be quick-make, quick-break such that, during normal operation of the switch, the operation of the contacts shall not be capable of being restrained by the

operating handle after the closing or opening action of the contacts has started.

- B. The operating handle shall be an integral part of the box, not the cover.
- C. Provisions for padlocking the switch in the OFF position with at least three padlocks shall be provided.
- D. The handle position shall travel at least 90° between OFF and ON positions to clearly distinguish and indicate handle position.
- E. Switches shall have a dual cover interlock mechanism to prevent unintentional opening of the switch cover when the switch is ON and prevent turning the switch ON when the cover is open. The cover interlock mechanism shall have an externally operated override but the override shall not permanently disable the interlock mechanism. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.

2.5 SWITCH ENCLOSURES

- A. Switch covers shall be attached with welded pin-type hinges (Type 1) or top-hinged, attached with removable screws and securable in the open position (Type 3R).
- B. The enclosure shall be finished with gray baked enamel paint which is electrodeposited on cleaned, phosphate pre-treated steel (Type 1) or gray baked enamel paint which is electrodeposited on cleaned, phosphate pre-treated galvanized steel (Type 3R).
- C. The enclosure shall have ON and OFF markings stamped into the cover.
- D. The operating handle shall be provided with a dual colored, red/black position indication.
- E. Switches shall have provisions to accept up to three 3/8" hasp padlocks to lock the operating handle in the OFF position.
- H. Tangential knockouts shall be provided to facilitate ease of conduit entry (Type 1).
- I. Type 3R enclosure shall contain no knockouts. Supply watertight hubs.
- J. Type 4x shall be stainless steel enclosure with no knockouts. Supply watertight hubs.

2.6 SWITCH RATINGS

- A. Switches shall be horsepower rated.
- B. The UL listed short circuit current rating of the switches shall be: 200,000 rms symmetrical amperes when used with or protected by Class R or Class J fuses 30-600 ampere employing appropriate fuse rejection schemes.

PART 3 EXECUTION

3.1 INSTALLATION

E. Install disconnect switches where indicated

shown or not shown.
F. Install fuses in fusible disconnect switches.

END OF SECTION

SECTION 26 43 13
SURGE PROTECTIVE DEVICES FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- A. The General Provisions, Supplemental General Provisions, Special Provisions, apply to work covered by this Section.
- B. Comply with Electrical Sections, as applicable. Refer to other Sections for coordination of work.

1.2 SCOPE OF WORK

- A. Provide labor, material, equipment, tools and services, and perform operations required for, and reasonably incidental to, the providing of a high-energy power conditioning surge protection device(s) at branch circuit panelboards where indicated on the Drawings. The device shall incorporate transient voltage surge suppression (TVSS) and high-frequency electrical line noise filtering. The device shall provide effective high energy transient voltage suppression, surge current diversion, high-frequency attenuation, and line stabilization in ANSI/IEEE C62.41-2002 environments connected downstream from the facility's main overcurrent protective device. The device shall be connected in parallel with the facility's wiring system.
- B. The device shall be installed as an integral part or external of the panelboard, switchboard.

1.3 SUBMITTALS

- A. Submit product data and shop drawings for products specified under PART 2 - PRODUCTS.
- B. Manufacturers' Product Data: Submit material specifications and installation data for products specified under PART 2 - PRODUCTS.
- C.
- D. Shop Drawings: Submit shop drawings to indicate information not fully described by the product data to indicate compliance with the contract documents.
 - 1 Include electrical characteristics and ratings for the specified equipment.
 - 2 Include wiring diagrams indicating the internal connections of the specified equipment within its enclosure.
 - 3 Drawings shall be provided indicating device dimensions, weights, mounting provisions, connection details and wiring diagrams.
 - 4 Documentation of the specified device UL 1449 3rd Edition voltage protection rating

(VPR) and per mode surge current rating shall be included. All submittals without this documentation will be rejected.

- 5 The manufacturer shall make available upon request certified documentation of applicable Location Category Testing in full compliance with ANSI/IEEE C62.41-1991 and ANSI/IEEE C62.45-1987 Guidelines.

E. Record Drawings

- 1 A complete set of manufacturers' product data and shop drawings indicating all post bid revisions and field changes.

1.4 QUALITY ASSURANCE

- A. Industry Reference Standards and Publications: The device shall be designed, manufactured, tested and installed in compliance with the latest editions of:
 - 1 American National Standards Institute (ANSI) and Institute of Electrical and Electronic Engineers (ANSI/IEEE C62.41-2002 and C62.45-2002)
 - 2 Federal Information Processing Standards Publication 94 (FIPS PUB 94)
 - 3 National Electrical Manufacturers Association (NEMA LS-1)
 - 4 National Fire Protection Association (NFPA 70, National Electrical Code (NEC), 75 and 78)
 - 5 Underwriters Laboratories UL 1449 Standard for Transient Voltage Surge Suppressors Surge Protection Devices and UL 1283 Standard for Electromagnetic Interference Filters.
- B. The device shall be UL listed under UL 1449 and UL 1283 complimentary listed.
- C. The device shall be warranted against defects in material and/or workmanship and any failure or end-of-life event including lighting for a minimum of TEN (10) years from the date of shipment.
- D.
- E. The device shall be thoroughly factory-tested before shipment. Testing of the device shall include but not be limited to quality control checks, maximum continuous operating voltage (MCOV) check, and clamping voltage verification tests. The MCOV check shall consist of a minimum of one (1) hour burn-in at the applicable MCOV.

F.

1.5 SYSTEM DESCRIPTION

- A. Environmental Requirements
 - 1 Storage Temperature: Storage temperature range shall be -40° to +85° C (-40° to +185° F).

- 2 Operating Temperature: Operating temperature range shall be -40° to +60° C (-40° to 140° F).
- 3 Relative Humidity: Operation shall be reliable in an environment with 5% to 95% non-condensing relative humidity.
- 4 Operating Altitude: The device shall be capable of operation in an altitude of 0 - 12,000 feet above sea level.
- 5 Audible Noise: The device shall not generate any audible noise.
- 6 Magnetic Fields: No appreciable magnetic fields shall be generated. The device shall be capable of use directly in computer rooms in any location without danger to data storage systems or devices.
- 7 Electrical Requirements
- 8 Device Operating Voltage: The nominal operating voltage and configuration shall be that of the switchgear, distribution panel, sub or branch panelboard. Maximum Continuous Operating Voltage (MCOV): The allowable maximum continuous operating voltage of all suppression components utilized in the unit shall not be less than 115% of the nominal operating voltage.
- 9 Operating Frequency: The operating frequency range of the device shall be 47 to 63 Hertz.

10 Protection Modes: The devices primary mode

1.6 DOCUMENTATION

- A. Equipment Manual. The manufacturer shall furnish an equipment manual with installation, operation, and maintenance instructions for the system.

PART 2 - PRODUCTS

3.1 MANUFACTURER

- 1 Square D
- 2 Eaton
- 3 Current Technology
- 4 THOR SYSTEMS

3.2 TRANSIENT VOLTAGE SURGE SUPPRESSION COMPONENTS

- A. The device shall include a solid-state suppression system which includes arrays of fused non-linear voltage dependent metal oxide varistors (MOV's) with similar operating characteristics. The suppression system shall not utilize gas tubes, spark gaps, silicon avalanche diodes or other components which might short or crowbar the line, thus leading to interruption of normal power flow to or system upset of connected loads. The suppression system shall not incorporate any other components which may degrade performance or reliability of the

3.3 HIGH-FREQUENCY FILTER

of protection shall be line-to-neutral. The secondary modes of protection shall be line-to-ground and neutral-to-ground.

11 Surge Current Capacity and Voltage Protection Rating: Unless specifically noted on the drawings and/or the schedules, the surge current capacity, and the voltage protection rating of the SPD shall be not less than listed on the following table.

Location	Per Mode Surge Current Rating	120/208vac 3 phase VPR	277/480vac 3 phase VPR
Switchgear	200,000 amps	900v	1200v
Distribution Panel	150,000 amps	900v	1200v
Sub or Branch Panel	100,000 amps	900v	1200v

The above text gives you the option to request a specific surge current rating on the riser or panel schedules

5. Construction: SPD's with a surge current rating of greater than 155,000 amps per mode shall be field serviceable modular devices. SPD's with a surge current rating of less than 155,000 amps may be non-modular.

- A. The device shall include a UL 1283 high frequency extended range tracking filter. The filter shall reduce fast rise-time, high-frequency, error-producing transients and electrical line noise eliminating disturbances which may lead to system upset. The filter shall provide minimum insertion loss of 45 dB at 100 kHz attenuation frequency utilizing the MIL-STD-E220A 50 ohm insertion loss methodology.

3.4 INTERNAL CONNECTIONS

- a. All internal wiring associated with the suppression/filter device and subject to surge currents shall utilize low-impedance copper bus bar and/or #4 AWG copper conductor or larger. All internal connections associated with the suppression/filter device and subject to surge currents shall be made with compression solderless-type lugs and shall be bolted to the bus bars in order to reduce overall system impedance.

3.5 FIELD CONNECTIONS

- A. The device shall include mechanical lugs for each phase, neutral and ground, or permanently connected conductors as applicable. The lugs shall accommodate up to #4 AWG copper conductor.

3.6 ENCLOSURE

- A. The device shall be provided in a surface mounted NEMA 1 type hinged enclosure, with a NEMA rating that matches or exceeds that of the switchgear, distribution panel, sub or branch panelboard that is being protected. of minimum 14 gauge steel, painted inside and out. Enclosure width shall not be greater than 24 inches.

3.7 MONITORING

- a. The device shall include solid-state, long-life externally mounted LED visual status indicators that indicate the on-line status of each phase of the unit.
- b. Dry Contacts
- c. Audible alarm with silence switch
- d. For Service Entrance or Switchgear SPD's: LED visual status indicators, Audible alarm with silence switch, Dry Contacts plus Surge Event Counter.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. The installation and testing of the system shall be in full accordance with the manufacturer's installation, operation and maintenance instructions, and all national and local codes.
- B. The device shall be installed as close as

practical to the facility's wiring system in accordance with NEC Article 285, IEEE 1100-2005 section 8.4.2.5, plus applicable national/local electrical codes and the manufacturer's recommended installation instructions. Connection shall be from a minimum 40A branch circuit breaker in the switchgear, distribution panel or panelboard with #4 AWG copper conductors not any longer than necessary, avoiding unnecessary bends. Advise the engineer if the installed In no case shall conductors will be longer than 3 feet in length. Verify circuit breaker size with manufacturer.

3.2 TESTING

- A. The system shall be field tested in the presence of the Owner. At the same time operational procedures shall be reviewed with the Owner.
- B. If external test equipment is required, two (2) testers shall be furnished to the owner and two (2) training sessions shall be furnished. The first training session shall be with 90 days of occupancy and the second training session shall be not less eight months, but not more than 12 months after the first training session. Training and test equipment shall be furnished at no additional cost to the owner.

END OF SECTION

SECTION 26 51 00
INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes interior lighting fixtures, lighting fixtures mounted on exterior building surfaces, emergency lighting units, and accessories.
- B. Related Sections include the following:

1.3 SUBMITTALS

- A. Product Data: For each type of lighting fixture indicated, arranged in order of fixture designation. Include data on features, accessories, and the following:
 - 1. Dimensions of fixtures.
 - 2. Select one of two subparagraphs below. With second subparagraph, photometric tests by manufacturer's laboratory are acceptable.
 - 3. Certified results of laboratory tests for fixtures and lamps for photometric performance.
 - 4. Emergency lighting unit battery and charger.
 - 5. LED lights
 - 6. Retain two subparagraphs below for projects with air-handling fixtures.
 - 7. Types of lamps.
- B. Delete paragraph and subparagraph below unless custom fixtures are indicated.
- C. Shop Drawings: Show details of nonstandard or custom fixtures. Indicate dimensions, weights, method of field assembly, components, features, and accessories.
 - 1. Wiring Diagrams: Detail wiring for fixtures and differentiate between manufacturer-installed and field-installed wiring.
- D. Consider retaining paragraph below for projects with congested ceiling space and where Drawings do not include comprehensive reflected ceiling plans.
- E. Coordination Drawings: Reflected ceiling plans and sections drawn to scale and coordinating fixture installation with ceiling grid, ceiling-mounted items, and other components in the vicinity. Include work of all trades that is to be installed near lighting equipment.
- F. Retain paragraph and subparagraphs below if fixture Samples are required for verification purposes. Edit if sample requirements are indicated in other than interior lighting fixture schedule. As an alternative, list of fixture types for sample submission can be added below.
- G. Delete paragraph below if not required.

- H. Product Certificates: Signed by manufacturers of lighting fixtures certifying that products comply with requirements.
- I. Delete paragraph below except for projects with extensive tests of emergency lighting equipment.
- J. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
- K. Maintenance Data: For lighting fixtures to include in maintenance manuals in the close out documents.

1.4 QUALITY ASSURANCE

- A. Fixtures, Emergency Lighting Units, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by an acceptable to authorities having jurisdiction.
- B. Comply with NFPA 70.
- C. Delete paragraph below if FM compliance is not required. Coordinate with Drawings.
- D. NFPA 101 Compliance: Comply with visibility and luminance requirements for exit signs.

1.5 COORDINATION

- A. Retain this Article if Coordination Drawings are not required.
- B. Fixtures, Mounting Hardware, and Trim: Coordinate layout and installation of lighting fixtures with ceiling system and other construction.

1.6 EXTRA MATERIALS

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products indicated in the Interior Lighting Fixture Schedule at the end of Part 3.
- B. Products: Subject to compliance with requirements, provide one of the products indicated for each designation in the Interior Lighting Fixture Schedule in the plans. Submit Manufacturers as is in the Lighting Fixture Schedule or Equal. Submit Equal Manufacturers 10 days prior to bidding day for approval. For Equal Manufacturers submit lighting calculation for each equal fixture submitted for approval.

2.2 FIXTURES AND FIXTURE COMPONENTS, GENERAL

- A. Metal Parts: Free from burrs, sharp corners, and edges.
- B. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.

- C. Doors, Frames, and Other Internal Access: Smooth operating, free from light leakage under operating conditions, and arranged to permit relamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during relamping and when secured in operating position.
- D. Reflecting Surfaces: Minimum reflectance as follows, unless otherwise indicated:
 - 1. White Surfaces: 85 percent.
 - 2. Specular Surfaces: 83 percent.
 - 3. Diffusing Specular Surfaces: 75 percent.
 - 4. Laminated Silver Metallized Film: 90 percent.
- E. Lenses, Diffusers, Covers, and Globes: 100 percent virgin acrylic plastic or annealed crystal glass, unless otherwise indicated.
 - 1. Plastic: High resistance to yellowing and other changes due to aging, exposure to heat, and ultraviolet radiation.
 - 2. Lens Thickness: 0.125 inch (3 mm) minimum, unless greater thickness is indicated.

2.3 LED FIXTURES

- A. Except as otherwise indicated, provide LED luminaires, of types and sizes indicated on fixture schedules.
- B. Include the following features unless otherwise indicated:
 - 1. Each Luminaire shall consist of an assembly that utilizes LEDs as the light source. In addition, a complete luminaire shall consist of a housing, LED array, and electronic driver (power supply).
 - 2. Each luminaire shall be rated for a minimum operational life of 50,000 hours utilizing a minimum ambient temperature of (25°C).
 - 3. Light Emitting Diodes tested under LM-80 Standards for a minimum of 12,000 hours.
 - 4. Color Rendering Index (CRI) of 82 at a minimum.
 - 5.
 - 6. Color temperature [3500] <Insert value> K, unless otherwise indicated.
 - 7. Rated lumen maintenance at 70% lumen output for 50,000 hours, unless otherwise indicated.
 - 8.
 - 9. Fixture efficacy of 60 Lumens/Watt, minimum.
 - 10.
 - 11. 5 year luminaire warranty, minimum.
 - 12.
 - 13. Photometry must comply with IESNA LM-79.
 - 14.
 - 15. The individual LEDs shall be constructed such that a catastrophic loss of the failure of one LED will not result in the loss of the entire luminaire.
 - 16.

- 17. Luminaire shall be constructed such that LED modules may be replaced or repaired without the replacement of the whole fixture.

C. Technical Requirements

- 1. Luminaire shall have a minimum efficacy of 60 lumens per watt. The luminaire shall not consume power in the off state.
- 2.
- 3. Operation Voltage: The luminaire shall operate from a 50 HZ to 60 HZ AC line over a voltage ranging from 120 VAC to 277 VAC. The fluctuations of line voltage shall have no visible effect on the luminous output.
- 4.
- 5. Power Factor: The luminaire shall have a power factor of 0.9 or greater.
- 6.
- 7. THD: Total harmonic distortion (current and voltage) induced into an AC power line by a luminaire shall not exceed 15 percent.
- 8.
- 9. Operational Performance: The LED circuitry shall prevent visible flicker to the unaided eye over the voltage range specified above.

D. Thermal Management

- 1. The thermal management (of the heat generated by the LEDs) shall be of sufficient capacity to assure proper operation of the luminaire over the expected useful life.
- 2.
- 3. The LED manufacturer's maximum thermal pad temperature for the expected life shall not be exceeded.
- 4.
- 5. Thermal management shall be passive by design. The use of fans or other mechanical devices shall not be allowed.
- 6.
- 7. The luminaire shall have a minimum heat sink surface such that LED manufacturer's maximum junction temperature is not exceeded at maximum rated ambient temperature.

2.4 LED EXIT SIGNS

- A. Exit light fixtures shall meet applicable requirements of NFPA and UL.
- B. Housing and door shall be die-cast aluminum.
- C. For general purpose exit light fixtures, door frame shall be hinged, with latch. For vandal-resistant exit light fixtures, door frame shall be secured with tamper-resistant screws.
- D. Finish shall be satin or fine-grain brushed aluminum.

- E. There shall be no radioactive material used in the fixtures.
- F. Fixtures:
 - 1. Inscription panels shall be cast or stamped aluminum a minimum of 2.25 mm (0.090 inch) thick, stenciled with 150 mm (6 inch) high letters, baked with red color stable plastic or fiberglass. Lamps shall be luminous Light Emitting Diodes (LED) mounted in center of letters on red color stable plastic or fiberglass.
 - 2. Double-Faced Fixtures: Provide double-faced fixtures where required or as shown on drawings.
 - 3. Directional Arrows: Provide directional arrows as part of the inscription panel where required or as shown on drawings. Directional arrows shall be the "chevron-type" of similar size and width as the letters and meet the requirements of NFPA 101.
- G. Voltage: Multi-voltage (120 – 277V).

2.5 EMERGENCY LIGHTING UNITS

- A. General Requirements: Self-contained units. Comply with UL 924. Units include the following features:
 - 1. Battery: Sealed, maintenance-free, lead-acid type with minimum 5-year nominal life and special warranty.
 - 2. Charger: Fully automatic, solid-state type with sealed transfer relay.
 - 3. Operation: Relay automatically turns lamp on when supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps, and battery is automatically recharged and floated on charger.

2.6 LAMPS

- A. ALL LED – NO LAMPS

2.7 FINISHES

- A. Fixtures: Manufacturer's standard, unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Fixtures: Set level, plumb, and square with ceiling and walls, and secure according to manufacturer's written instructions and approved submittal materials. Install lamps in each fixture.
- B. NFPA 70 requires minimum support for fixtures. Retain paragraphs below for more specific support requirements and for requirements exceeding code minimums. Units in seismic zones must have additional supports and re-

straining devices beyond those specified here. See Editing Instruction No. 3 in the Evaluations.

- C. Support for Fixtures in or on Grid-Type Suspended Ceilings: Do not use grid for support.
 - 1. Install a minimum of two ceiling support system wires for each fixture. Locate not more than 6 inches (150 mm) from fixture corners.
 - 2. Support Clips: Fasten to fixtures and to ceiling grid members at or near each fixture corner.
 - 3. Fixtures of Sizes Less Than Ceiling Grid: Arrange as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch (20-mm) metal channels spanning and secured to ceiling tees.
- D. Suspended Fixture Support: As follows:
 - 1. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
 - 2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.

3.2 CONNECTIONS

- A. Ground equipment.
 - 1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 FIELD QUALITY CONTROL

- A. Inspect each installed fixture for damage. Replace damaged fixtures and components.
- B. Advance Notice: Give dates and times for field tests.
- C. Provide instruments to make and record test results.
- D. Tests: As follows:
 - 1. Verify normal operation of each fixture after installation.
 - 2. Emergency Lighting: Interrupt electrical supply to demonstrate proper operation.
 - 3. Verify normal transfer to battery source and retransfer to normal.
 - 4. Report results in writing.
- E. Malfunctioning Fixtures and Components: Replace or repair, then retest. Repeat procedure until units operate properly.
- F. Corrosive Fixtures: Replace during warranty period.

3.4 CLEANING AND ADJUSTING

- A. Clean fixtures internally and externally after installation. Use methods and materials recommended by manufacturer.
- B. Adjust aimable fixtures to provide required light intensities.

END OF SECTION

**SECTION 26 56 00
EXTERIOR LIGHTING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes exterior lighting units with luminaires and lamps.
- B. Related Sections include the following:
 - 1. Section "Interior Lighting" for interior fixtures, lamps, ballasts, emergency lighting units, and accessories; and for exterior luminaires normally mounted on buildings.

1.3 DEFINITIONS

- A. Lighting Unit: A luminaire or an assembly of luminaires complete with a common support, including pole, post, or other structure, and mounting and support accessories.
- B. Luminaire (Light Fixture): A complete lighting device consisting of lamp(s) and ballast(s), when applicable, together with parts designed to distribute light, to position and protect lamps, and to connect lamps to power supply.

1.4 SUBMITTALS

- A. Product Data: For each type of lighting unit indicated, arranged in order of lighting unit designation. Include data on features, accessories, finishes, and the following:
 - 1. Materials and dimensions of luminaires.
 - 2. Delete "independent" in subparagraph below if certified tests by manufacturer are adequate.
 - 3. Select one of two subparagraphs below. With second subparagraph, photometric tests by manufacturer's laboratory are acceptable.
 - 4. Certified results of independent laboratory tests for fixtures and lamps for electrical ratings and photometric data.
 - 5. Certified results of laboratory tests for fixtures and lamps for photometric performance.
 - 6. High-intensity-discharge luminaire ballasts.
- B. Product Certificates: Signed by manufacturers of lighting units certifying that products comply with requirements.
- C. Delete paragraph below except for projects with extensive tests of installations.
- D. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
- E. Maintenance Data: For lighting units to include in maintenance manuals specified in other sections.

1.5 QUALITY ASSURANCE

- A. Luminaires and Accessories: Listed and labeled as defined in NFPA 70, Article 100, for their indicated use, location, and installation conditions by acceptable to authorities having jurisdiction
- B. Comply with ANSI C2.
- C. Comply with NFPA 70.

1.6 WARRANTY

- A. General Warranty: LED fixture warranty is a five year limited warranty. Pole standard warranty is one year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products indicated in the Exterior Lighting Unit Schedule at the end of Part 3.
- B. Retain above for nonproprietary or below for semiproprietary Specification, and name products in schedules or details.
- C. Products: Subject to compliance with requirements, provide one of the products indicated for each designation in the Interior Lighting Fixture Schedule in the plans. Submit Manufacturers as is in the Lighting Fixture Schedule or Equal. Submit Equal Manufacturers 10 days prior to bidding day for approval. For Equal Manufacturers submit lighting calculation for each equal fixture submitted for approval.

2.2 LUMINAIRES

- A. Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.
- B. Metal Parts: Free from burrs, sharp corners, and edges.
- C. Sheet Metal Components: Corrosion-resistant aluminum, unless otherwise indicated. Form and support to prevent warping and sagging.
- D. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free from light leakage under operating conditions, and arranged to permit relamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during relamping and when secured in operating position. Provide for door removal for cleaning or replacing lens. Arrange to disconnect ballast when door opens.
- F. Exposed Hardware Material: Stainless steel.

- G. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and ultraviolet radiation.
- H. Reflecting Surfaces: Minimum reflectance as follows, unless otherwise indicated:
 - 1. White Surfaces: 85 percent.
 - 2. Specular Surfaces: 83 percent.
 - 3. Diffusing Specular Surfaces: 75 percent.
- I. Lenses and Refractors: Materials as indicated. Use heat- and aging-resistant, resilient gaskets to seal and cushion lens and refractor in luminaire doors.
- J. Photoelectric Relays: As follows:
 - 1. Contact Relays: Single throw, arranged to fail in the on position and factory set to turn light unit on at 1.5 to 3 fc (16 to 32 lx) and off at 4.5 to 10 fc (48 to 108 lx) with 15-second minimum time delay.
 - 2. Relay Mounting: In luminaire housing.
- K. High-Intensity-Discharge Ballasts: Comply with ANSI C82.4. Constant wattage auto-transformer or regulating high-power-factor type, unless otherwise indicated.
 - 1. Single-Lamp Ballasts: Minimum starting temperature of minus 40 deg C.
 - 2. Open-circuit operation will not reduce average life.
 - 3. High-Pressure Sodium Ballasts: Equip with a solid-state igniter/starter having an average life in pulsing mode of 10,000 hours at an igniter/starter case temperature of 90 deg C.
 - 4. Noise: Uniformly quiet operation, with a noise rating of B or better.
- L. Lamps: Comply with the standard of the ANSI C78 series that is applicable to each type of lamp. Provide luminaires with indicated lamps of designated type, characteristics, and wattage. Where a lamp is not indicated for a luminaire, provide medium wattage lamp recommended by manufacturer for luminaire.
- M. LED sources shall meet the following requirements:
 - 1. Operating temperature rating shall be between -40 degrees C (-40 degrees F) and 50 degrees C (120 degrees F).
 - 2. Correlated Color Temperature (CCT): 4000K
 - 3. Color Rendering Index (CRI): ≥ 85 .
 - 4. The manufacturer shall have performed reliability tests on the LEDs luminaires complying with Illuminating

LED DRIVERS

- A. LED drivers shall meet the following requirements:
 - 1. Drivers shall have a minimum efficiency of 85%.
 - 2. Starting Temperature: -40 degrees C (-40 degrees F).
 - 3. Input Voltage: 120 to 480 ($\pm 10\%$) volt.
 - 4. Power Supplies: Class I or II output.
 - 5. Surge Protection: The system must survive 250 repetitive strikes of "C Low" (C Low: 6kV/1.2 x 50 μ s, 10kA/8 x 20 μ s) waveforms at 1-minute intervals with less than 10% degradation in clamping voltage. "C Low" waveforms are as defined in IEEE/ASNI C62.41.2-2002, Scenario 1 Location Category C.
 - 6. Power Factor (PF): ≥ 0.90 .
 - 7. Total Harmonic Distortion (THD): $\leq 20\%$.
 - 8. Comply with FCC Title 47 CFR Part 18 Non-consumer RFI/EMI Standards.
 - 9. Drivers shall be reduction of hazardous substances (ROHS)-compliant.

PART 3 - EXECUTION**3.1 CONNECTIONS**

- A. Ground equipment.
 - 1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Ground metal poles/support structures according to Section "Grounding and Bonding."
 - 1. Nonmetallic Poles: Ground metallic components of lighting units and foundations. Connect luminaires to grounding system with No. 6 AWG conductor.

3.2 FIELD QUALITY CONTROL

- A. Inspect each installed unit for damage. Replace damaged units.
- B. Advance Notice: Give dates and times for field tests.
- C. Provide instruments to make and record test results.
- D. Tests and Observations: Verify normal operation of lighting units after installing luminaires and energizing circuits with normal power source, and as follows:

3.3 CLEANING AND ADJUSTING

- A. Clean units after installation. Use methods and materials recommended by manufacturer.

END OF SECTION

DIVISION 27

COMMUNICATIONS

THE AGREEMENT, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, SUPPLEMENTARY CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, AND ALL ADDENDA ARE A PART OF THE CONTRACT. THE CONTRACTOR SHALL CONSULT THEM IN DETAIL FOR INSTRUCTIONS PERTAINING TO THE WORK. THE CONTRACTOR SHALL ALSO CONSULT ALL OTHER DIVISIONS AND SECTIONS OF THE PROJECT MANUAL, AND ALL DRAWINGS IN THE EXECUTION OF THE WORK OF THE CONTRACT.

THE CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, SYSTEMS, EQUIPMENT, ITEMS, ARTICLES, OPERATIONS, AND/OR METHODS LISTED, IMPLIED, MENTIONED, OR SCHEDULED IN THE CONTRACT DOCUMENTS AND/OR NECESSARY AND/OR REQUIRED FOR THE SATISFACTORY COMPLETION OF THE WORK.

THE LISTING OF WORK, REQUIREMENTS, AND PRODUCTS IN THIS SECTION IS NOT INTENDED TO BE CONCLUSIVE. THE CONTRACTOR SHALL CHECK ALL OTHER PARTS OF THE CONTRACT DOCUMENTS AND SHALL PROVIDE ALL MISCELLANEOUS ITEMS OF WORK AND PRODUCTS NECESSARY FOR THE SATISFACTORY COMPLETION OF THE WORK DESCRIBED IN THE CONTRACT DOCUMENTS.

**SECTION 27 00 00
COMMUNICATIONS**

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, General Project Requirements, Design/Build Requirements, General Mechanical/Electrical Requirements and general provisions of the Contract including General Conditions apply to this Section.

1.2 SUMMARY

- A. All communications systems Work performed on this project shall be done on a design/build basis.
- B. Unless specifically shown otherwise, work includes providing all devices, cable, conduit, connections and accessories indicated or required to properly construct the complete scope of project communication systems Work indicated including all:
 - 1. Voice/Data systems.
 - 2. Security systems.
 - 3. Miscellaneous requirements including:
 - a. Providing complete shop drawings and product data including detailed equipment catalog cut sheets, wiring

1.3 REGULATORY COMPLIANCE

- E. See General Project Requirements.
- F. All communications systems related Work including design and engineering, material packaging, shipping and delivery, handling, labeling, storing and protecting and installation shall be performed in strict compliance with all Federal, State, County, Municipal or other Local bodies having jurisdiction over Work including the NEC and OSHA.
- G. Comply with the latest revision of applicable wiring codes and regulations for all Work. Follow the most stringent regulations when conflict exists between local or national codes or regulations.

1.4 SUBMITTALS

- A. See General Project Requirements.
- B. Provide complete shop drawings/product data for all products required under this Section.

1.5 COORDINATION

- A. See General Project Requirements Project

PART 2 PRODUCTS

2.1 GENERAL PRODUCT REQUIREMENTS

- A. General Product Requirements: See General Project Requirements (including Product Selection Procedures) and General Mechanical/Electrical Requirements.
- B. Conduit: Products, Required Locations, Acceptable Installation Locations and Installation Requirements: See Electrical Requirements.
- C. All communication system conduit and cable shall terminate in Telecom Room or where shown or directed unless specifically shown otherwise. Coordinate all final required termination points with Owner prior to installation.
- D. Miscellaneous Materials:

diagrams. See General Project Requirements.

- b. Providing all required temporary facilities and controls. See General Project Requirements.
- c. Providing complete Record Documents including O & M manuals. See General Project Requirements.

1.3 RELATED SECTIONS

- A. General Project Requirements:
 - 1 Definitions.
 - 2 General Requirements.
 - 3 Existing Conditions.
 - 4 Contract Modifications.
 - 5 Owner Furnished Equipment.
 - 6 Substantial Completion.
 - 7 Record Documents.
 - 8 General Product Requirements.
 - 9 General Installation Requirements.
 - B. Design/Build Requirements.
 - C. General Mechanical/Electrical Requirements.
 - D. Electrical Requirements.
 - 1. Concrete Housekeeping Pads, Foundations and Other Supports:
 - a. The Contractor or Subcontractor whose equipment the concrete pad, foundation or other support services, is to design, locate, size and pay for the concrete pad, foundation or other support.
 - b. See General Project Requirements.
 - 2. Sleeves: Provide properly sized, secure, weather tight (where applicable) sleeves for all plumbing penetrations of walls, foundations, partitions, floors and roofs required for the proper installation of the Work.
 - 3. Escutcheons: Provide properly sized, secure chrome plated escutcheons at all plumbing penetrations including those inside of casework.
 - 4. *4. Additional Products: As shown or required to properly and successfully complete the scope of this Work indicated. See General Project Requirements, Design/Build Requirements, General Mechanical/Electrical Requirements and Drawings.*
 - E. Verify required termination points and other requirements of all communication systems with Owner prior to installation.
- 2.1 GENERAL SERVICE ENTRANCE REQUIREMENTS (FOR ALL SYSTEMS)**
- A. All communication system service entrances shall begin at nearest acceptable Local Communications Utility connection and shall terminate in Telecom Room unless specifically shown, required or directed otherwise.

- B. Provide the number and sizes of service entrance conduits indicated.
- C. All communication system conduits shall enter the building underground and come up through the floor slab being stubbed-up 1 FT above the adjacent finished floor in Telecom Room unless specifically shown, required or directed otherwise.
- D. All blank conduits indicated for Owner's future use shall be provided with a pull wire and capped on both ends unless specifically shown, required or directed otherwise.

2.2 VOICE/DATA SYSTEMS

- A. Division of Responsibility:
 - 1. Contractor's Requirements:
 - a. All required rough-in interior and exterior raceway systems (including required service entrance) and cable.
 - b. All required devices, cover plates, patch panels, connections at both user end and in Telecom Room, testing and all other related accessories.
 - 2. Owner's Requirements: All required servers, telephone equipment, telephones, and all other related accessories.
- B. Exterior Requirements – Service Entrance:
 - 1. See General Service Entrance Requirements herein.
 - 2. Provide two (4") Schedule 40 PVC underground conduits with pull wires. One will be used now and the second one will be for Owner's future use.
- C. Interior Requirements: Provide complete voice/data system.
 - 1. Provide double gang boxes at all telephone/data locations.
 - a. Exception: Provide single gang boxes at all wall telephone locations.
- D. Cable/Wire:
 - 1. Specifications are based on Belden products. Approved equal products from Siemon and Panduit are also acceptable.
 - 2. For Cat6 installations, cable must meet ANSI/TIA/EIA-568-C.2 Category 6 copper cabling 23-4P UTP specs. Belden DataTwist 2413 series with white or blue jacket.
 - 3. For Cat6A installations, cable must meet ANSI/TIA/EIA-568-C.2 Category 6A copper cabling 23-4P UTP specs. Belden 10GX3 bonded pair series.
 - 4. Telephone Cable: Same as Cat6 data cable.
 - 5. Utilize the same manufacturer for all copper cable and components.
 - 6. Provide plenum rated cable where required.

E. Approved Copper Cabling, Jacks, & Racks Parts List (As Applicable):

- A. Owner prior to installation.

PART 3 EXECUTION

3.1 PRE-INSTALLATION MEETINGS

General Description	Mfg Part number	Part Description
Wall plate	AX102249	Belden KeyConnect 4-port Wallplate,
Cat6 Data Jack	RV6MJKUEW	White Belden RevConnect CAT6+ Jack
Cat6A Data Jack	RVAMJKUEW	Cat 6, White Belden RevConnect CAT6A Jack Cat 6A, White
Blanks	AX102262	Belden KeyConnect Single Position
CATV	AX102907	Blank Belden KeyConnect Cable TV Jack-Video F Coaxial
48-port Patch Panels	AX103249	Belden 48 Port KeyConnect CAT6+ AngleFlex Patch Panel - Empty
24-port Patch Panels	AX103248	Belden 24 Port KeyConnect CAT6+ AngleFlex Patch Panel - Empty
Modular Furniture Outlet	AX102291	Belden KeyConnect 3-port Mod Furniture Adapter, White
Cable Management	35441-702	CPI 2U Horizontal Cable Manager
Equipment Rack	55053-703	CPI 7' X 19" Equipment Rack
Cable Management Vertical	35521-703	CPI 7' Evolution g2 Double Sided Vertical Cable Manager (1 on each side of Equipment Rack) = 6"

- E. Cover Plates: High-Impact smooth nylon. Provide same color and material as the adjacent wall outlet and light switch cover plates. See Electrical Requirements.

2.3 SECURITY SYSTEMS

- A. Division of Responsibility:
 - 1. Contractor's Requirements:
 - a. All required rough-in for interior and exterior raceway systems.
 - b. All required power and communication outlets for communications equipment.
 - 2. Owner's Requirements: All devices, cover plates, card readers, intrusion devices, CCTV equipment, cable, connections on both ends and all other related accessories.
- B. Card Readers:
 - 1. Interior Requirements:
 - a. Card Readers @ Exterior Doors: Provide conduit, recessed boxes with cover plates and pull wire at each exterior swinging door for Owner provided card readers. Continue each conduit back into Telecom Room terminating where directed by Owner. Locate at approximately 4 FT AFF on the latch side of each door.

2.4 GROUNDING

- A. Provide master ground bus connection from the building's main electrical service entrance into Telecom Room according to NEC Table 250.66.
- B. Conduit: Provide 2" PVC sleeve for entry into Telecom Room extending the sleeve from below frost level to 12" above the floor in the Telecom Room.
- C. Grounding Conductors: Provide two 4/0 stranded copper insulated Bond the conductors to the electric service entrance and bus bars using cad-weld or other acceptable means.
- D. Bus Bars: Provide one 4 foot long x 4" high x 1/4" thick bus bars in the Telecom Room. Install on plywood panel board centering on wall using stand-offs and insulators where shown or directed.
- E. Verify all final requirements with

- A. See General Mechanical Electrical Requirements.

3.2 INSTALLATION

- A. General Installation Requirements: See General Project Requirements and General Mechanical/Electrical Requirements.

3.3 VOICE/DATA SYSTEMS

- A. Number of Cables Required: Provide the following minimum number of cables at each location. Continue each cable back into the Telecom Room as a "home run".
1. At each combination telephone/data jacks:
 - 2.
 2. At each wall phone outlet: 1.
- B. Provide each wall combination phone/data jack with 4 positions as follows:
1. Top Row: 2 Cat 6 data jacks on the top (one red, one blue).
 2. Bottom Row: 2 blanks for future use.
- C. Terminate cable on RJ-45 connectors with CAT 6 couplers at user end wiring per T568B.
- D. Provide cable management between the patch panels and above/below the top/bottom patch panels.
- E. Provide "home runs" from device into Telecom Room for all voice and data cables. No split cabling will be performed on any of the cables.
- F. Install and support all copper cable in a method that will not alter the operational characteristics of the copper as specified by the manufacturer.
- G. Support all cable runs by cable raceways or flex duct and be free of tension.
- H. Securely bolt all 19-inch equipment racks to the concrete floor using concrete anchor bolts.
- I. Provide a minimum 6 AWG conductor between all equipment racks and an electrical ground.
- J. Terminate all conduit occurring in rooms without ceilings where shown on drawings or as directed.

3.3 LABELING

- A. Mark all cables with a unique matching identification on each end. Verify requirements with Owner. Naming convention for labels will be furnished to contractor by Owner prior to starting job. Verify requirements with Owner prior to proceeding.
- B. Label each end of all horizontal UTP cables with a permanent, unique identifier.
- C. Label all faceplates using the same naming system with machine-generated labels inserted under the clear label covers of the faceplates.

- D. Label patch panel connections using Owner naming standards.

3.4 TESTING/WARRANTY/INSPECTION

- A. Test all cables for continuity on all parts and/or conductors.
- B. Utilize certified installers that carry a manufacturer's system performance and product warranty to install the proposed structured cabling system. All horizontal UTP cable test shall comply with and meet or exceed all specifications so as to comply with the individual manufacturers warranty for the cable and outlets.
- C. Test data cables for cable performance performing the following tests:
1. Power sum Near End Crosstalk (NEXT).
 2. Insertion Loss.
 3. Return Loss.
 4. Equal Level Far End Crosstalk (ELFEXT).
 5. Power Sum Equal Level Far End Crosstalk (power Sum ELFEXT)
 6. Attenuation to Crosstalk Ratio (ACR).
- D. Test all horizontal UTP cables in both directions according to ANSI/TIA/EIA TSB 67. Final installation shall meet or exceed all of the specifications recommended in that document for basic link configurations prior to system cut-over and acceptance.
- E. Submit 3 copies of a complete written test report for all required testing to Owner. Test report shall include the following minimum information:
- F. Type, number and location of all tests performed.
- G. Expected test results.
- H. Actual tests results achieved.
- I. Correct any installations that do not meet minimum test results and retest.
- J. Owner will conduct a final walk-through (punch-out) inspection to accept completion of the project.

END OF SECTION

SECTION 27 05 33
CONDUITS AND BACKBOXES FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- A. The General Provisions, Supplemental General Provisions, Special Provisions apply to work covered by this Section.
- B. Comply with Sections 26 00 00, as applicable. Refer to other Sections for coordination of work.

1.2 SCOPE OF WORK

- A. Provide labor, materials, equipment, tools and services, and perform operations required for, and reasonably incidental to, the providing of a telephone and data communications empty conduit system, including all related systems and accessories.

1.3 SUBMITTALS

- A. Submit product data and shop drawings in accordance with the Architectural sections.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Conduit, conduit sleeves, outlet boxes, cover plates and pullwire as indicated.
- B. Fireproofing material for telephone and data communication conduit and conduit sleeves through fire rated walls and floors.

PART 3 - EXECUTION

1.4 INSTALLATION

- A. Install telephone and data communication raceways as indicated.
- B. Install individual raceways from telephone and data communications outlets to above accessible ceiling. In areas without a ceiling,

raceways shall be routed to the nearest ceiling space. In building without a ceiling, raceways shall be extended back to the main telephone/ data communication board or to a location indicated on the Drawings.

- 1 Minimum size conduit: one inch, REFER TO PLANS FOR SIZES.
- 2 Raceway installation shall be in accordance with Section 26 05 33.
- 3 Coordinate raceway installations in millwork and other fabricated architectural items with the other portions of the Work.
- 4 Provide pullwire in each raceway tagged on each end.
- 5 Raceways shall be terminated with an **insulating bushing** or a suitable connector with an insulated throat.
- C. Provide telephone and data communications outlet boxes.
- 6 Provide a one-gang outlet unless noted otherwise.
- 7 Install outlet box and device ring at each location.
- 8 Install telephone and data communications outlets at same height specified for convenience outlets unless noted otherwise. Group telephone and data communications outlets with related receptacle outlets unless noted otherwise.
- 9 Install a blank cover plate on all unused communications outlet boxes.

END OF SECTION

DIVISION 28

ELECTRONIC SAFETY AND SECURITY

THE AGREEMENT, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, SUPPLEMENTARY CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, AND ALL ADDENDA ARE A PART OF THE CONTRACT. THE CONTRACTOR SHALL CONSULT THEM IN DETAIL FOR INSTRUCTIONS PERTAINING TO THE WORK. THE CONTRACTOR SHALL ALSO CONSULT ALL OTHER DIVISIONS AND SECTIONS OF THE PROJECT MANUAL, AND ALL DRAWINGS IN THE EXECUTION OF THE WORK OF THE CONTRACT.

THE CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, SYSTEMS, EQUIPMENT, ITEMS, ARTICLES, OPERATIONS, AND/OR METHODS LISTED, IMPLIED, MENTIONED, OR SCHEDULED IN THE CONTRACT DOCUMENTS AND/OR NECESSARY AND/OR REQUIRED FOR THE SATISFACTORY COMPLETION OF THE WORK.

THE LISTING OF WORK, REQUIREMENTS, AND PRODUCTS IN THIS SECTION IS NOT INTENDED TO BE CONCLUSIVE. THE CONTRACTOR SHALL CHECK ALL OTHER PARTS OF THE CONTRACT DOCUMENTS AND SHALL PROVIDE ALL MISCELLANEOUS ITEMS OF WORK AND PRODUCTS NECESSARY FOR THE SATISFACTORY COMPLETION OF THE WORK DESCRIBED IN THE CONTRACT DOCUMENTS.

SECTION 28 31 11
DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEMS

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- A. The General Provisions, Supplemental General Provisions, Special Provisions and Specification Sections apply to Work covered by this Section.
- B. Comply with applicable sections in division 26. Refer to other Sections for coordination of the Work.

1.2 SCOPE OF WORK

- A. Provide labor, materials, equipment, tools and services, and perform operations required for, and reasonably incidental to, the providing additional and new devices for new building.
 - 1. Fire alarm control panel
 - 2. Remote Annunciator
 - 3. Addressable or conventional manual fire alarm stations.
 - 4. Addressable analog and conventional area smoke detectors.
 - 5. Conventional beam detectors.
 - 6. Addressable analog and conventional duct smoke detectors.
 - 7. Addressable analog and conventional heat detectors.
 - 8. Sprinkler water flow alarm switches.
 - 9. Audible notification appliances; bells, horns, chimes.
 - 10. Visual notification appliances; strobes.
 - 11. Central station alarm connection control.
 - 12. Air handling systems shutdown control.
 - 13. Magnetic door holder release.
 - 14. Dry pipe sprinkler release valve/deluge valve control.
 - 15. Sprinkler supervisory switches and tamper switch supervision.
 - 16. Dry pipe sprinkler release valve/deluge valve supervision.
 - 17. Battery standby.
 - 18. System shall activate the overhead gates. Provide all accessories for an active system.

1.3 SUBMITTALS

- A. Submit product data and shop drawings in accordance with other Sections for products specified under PART 2 - PRODUCTS. Shop drawings shall be generated by the Fire Alarm Contractor without the Engineers plans.
- B. The submittal data shall include, but not necessarily be limited to, the following:
 - 1. Complete bill of material indicating quantity, part numbers and brief description.

- 2. Data sheets for all products. If multiple models are shown on the same data sheet, highlight the specific model used.
- 3. Provide drawing with all devices.

1.4 REFERENCE STANDARDS

- A. The fire alarm system devices specified herein shall be designed, manufactured, installed and tested according to the latest version of the following standards:
 - 1 National Fire Protection Association Standards
 - 1. NFPA 70 - National Electric Code (NEC), Articles 725 & 760.
 - 2. NFPA 71 - Central Station Signaling Systems
 - 3. NFPA 72 - National Fire Alarm Code (NFAC)
 - 4. NFPA 92A - Smoke Control Systems
 - 5. NFPA 101 - Life Safety Code
 - 6. Underwriters Laboratories, Inc.
 - 7. UL 38 - Manually Activated Signaling Boxes
 - 8. UL 228 - Door Holders for Fire Protective Signaling Systems
 - 9. UL 268 - Smoke Detectors for Fire Protective Signaling Systems
 - 10. UL268A - Smoke Detectors for Duct Applications
 - 11. UL 346 - Waterflow Indicators for Fire Protective Signaling Systems
 - 12. UL 464 - Audible Signaling Appliances
 - 13. UL 864/UOJZ/APOU - Control Units for Fire Protective Signaling Systems
 - 14. UL 1481 - Power Supplies for Fire Protective Signaling Systems
 - 15. UL 1638 - Visual Signaling Appliances
 - 16. UL 1711 - Amplifiers for Fire Protective Signaling Systems
 - 17. UL 1971 - Standard for Fire Protective Signaling Systems
 - 18. Americans with Disabilities Act (ADA)
 - 19. Local and State Building Codes
 - 20. Local Authorities Having Jurisdiction (LAHJ)

1.5 QUALITY ASSURANCE

- A. The fire alarm system devices shall be listed and labeled by Underwriters Laboratories, Inc. for use in fire protective signaling system.
- B. The Installing Contractor shall be factory authorized and trained and shall be NICET certified in the sub-field of Fire Alarm Systems, for the engineering and technical installation and supervision of the system. This certification shall be Level III for engineering and Level II for technical installation and supervision. Proof of certification shall be

provided. All work shall be performed by skilled technicians, under the supervision and direction of the designated NICET engineering technician, all of whom shall be properly trained and qualified for the work.

- C. The fire alarm contractor shall not sub out portion of the work. The fire alarm shall be responsible to complete the job.
- D. Submission to Authority Having Jurisdiction: Submit copies of State Certificate as required by State Fire Marshall. Provide copy with operating and maintenance manual.

1.6 QUALIFICATIONS

1. The fire alarm contractor, as a business entity, shall be an authorized and designated representative of the equipment manufacturer and shall have been actively engaged in the business of selling, installation and servicing fire alarm systems for a period of at least (5) years prior to the bid date.
2. The fire alarm contractor shall have an office within the Rio Grande Valley with trained technicians who are qualified to manage the installation, to be responsible that the system is installed as submitted, to conduct system start-up, to instruct the project coordinators representatives and local authorities in the proper operation of the system, and to provide service throughout the warranty period.
3. The fire alarm contractor **SHALL NOT HAVE** any grievances or complaints on record regarding workmanship, code compliance, or service response with either the project coordinator, Architect, Engineer, Owner or the State Fire Marshals office. A contractor that has any prior finding(s) of a Fire Alarm license violation or has any litigation in process with the State Fire Marshal is **unacceptable**.
3. The fire alarm contractor shall be an active installer on the approved manufacturer for a minimum of 5 years.

1.7 WARRANTY

1. Warranty of all control equipment, sensors, I/O modules and all other peripherals and of materials, installation and workmanship shall be for one (1) year from date of acceptance.
2. The Contractor shall guarantee all wiring and raceways to be free from inherent mechanical or electrical defects for one (1) year from date of final acceptance.

PART 2 - PRODUCTS

1.8 MANUFACTURER

- A. Siemens

1.9 CIRCUITING GUIDELINES

- A. Each addressable analog loop shall be circuited as shown on the drawings but device loading in not to exceed 80% of loop capacity in order to leave for space for future devices. The loop shall have Class A operation. When it is necessary to interface conventional initiating devices provide intelligent input modules to supervise Class A zone wiring. The audio system components shall be an integral part of the fire alarm system control panel.

B. Audio Amplifiers

1. Each audio power amplifier shall have integral audio signal de-multiplexers, allowing the amplifier to select any digitized audio channels. The channel selection shall be directed by the system software. Multiple and different audio signals shall be able to be broadcast simultaneously from the same system network node.
2. Each amplifier output shall include a dedicated, supervised speaker circuit which is suitable for connection of emergency speaker appliances. Each amplifier shall also include a notification appliance circuit for connection of visual (strobe) appliances. This circuit shall be fully programmable and it shall be possible to define the circuit for the support of audible, visible, or ancillary devices.
3. Standby audio amplifiers shall be provided that automatically sense the failure of a primary amplifier, and automatically program themselves to select and de-multiplex the same audio information channel of the failed primary amplifier, and fully replace the function of the failed amplifier.
4. In the event of a total loss of audio data communications, all amplifiers will default to the local "EVAC" tone generator channel. If the local panel has an alarm condition, then all amplifiers will sound the EVAC signal on their connected speaker circuits.
5. In the event of a loss of the fully digitized, multiplexed audio riser, the audio amplifiers shall automatically default to an internally generated alarm tone.
6. Audio amplifiers shall automatically detect a short circuit condition on the connected speaker circuit wiring, and shall inhibit itself from driving into that short circuit condition.

1.10 DETECTORS

A. General

1. Detectors shall be capable of full digital

communications using both broadcast and polling protocol. Each detector shall be capable of performing independent fire detection algorithms. The fire detection algorithm shall measure sensor signal dimensions, time patterns and combine different fire parameters to increase reliability and distinguish real fire conditions from unwanted deceptive nuisance alarms. Signal patterns that are not typical of fires shall be eliminated by digital filters.

2. Detectors shall have an integral microprocessor capable of making alarm decisions based on fire parameter information stored in the detector head. Distributed intelligence shall improve response time by decreasing the data flow between detector and loop controller. Detectors not capable of making independent alarm decisions shall not be acceptable. Maximum total loop response time for detectors shall be 0.5 seconds.
3. Detectors shall have a separate means of displaying communication and alarm status. A green LED shall flash to confirm communication with the loop controller. A red LED shall flash to display alarm status. Both LEDs on steady shall indicate alarm-standalone mode status. Both LEDs shall be visible through a full 360 degree viewing angle.
4. Detectors shall be capable of identifying diagnostic codes to be used for system maintenance. The diagnostic codes shall be stored at the detector.
5. Detectors shall be capable of transmitting pre-alarm and alarm signals in addition to the normal, trouble and need cleaning information. It shall be possible to program control panel activity to each level. Each detector shall be individually programmable to operate at various sensibility settings.
6. The detector microprocessor shall contain an environmental compensation algorithm which identifies and sets ambient "environmental thresholds." The microprocessor shall continually monitor the environmental impact of temperature, humidity, other contaminants as well as detector aging. The process shall employ digital compensation to adapt the detector to both long term and short term environmental changes. The microprocessor shall monitor the environmental compensation value and alert the system operator when the

detector approaches the allowable environmental compensation value. Differential sensing algorithms shall maintain a constant differential between selected detector sensitivity and the "learned" base line sensitivity. The base line sensitivity information shall be permanently stored at the detector.

7. The detector and loop controller shall provide increased reliability and inherent survivability through intelligent conventional operation. The device shall automatically change to stand alone, conventional device operation in the event of a loop controller polling communications failure. In the standalone detector mode, the detector shall continue to operate using sensitivity and environmental compensation information, stored in its microprocessor at the time of communications failure. The loop controller shall monitor the loop and activate a loop alarm if a detector reaches its alarm sensitivity threshold.
8. Detectors shall be capable of automatic electronic addressing and/or custom addressing. Devices using DIP or rotary switches for addressing, either in the base or on the detector shall not be acceptable.
9. Detectors shall be suitable for operation in the following environment:
 1. Temperature: 32°F to 120°F
 2. Humidity: 0-93% RH, non-condensing
 3. Elevation: Up to 6,000 ft.
10. Photoelectric Smoke Detectors
 - ii. Addressable intelligent photoelectric smoke detectors shall be provided as indicated on the Drawings. The detector shall use a light scattering type photo electric smoke sensor to sense changes in air samples from its surroundings. An integral microprocessor shall dynamically examine values from the sensor and initiate an alarm based on the analysis of data. The detector shall utilize digital filters to remove signal patterns that are not typical of fires. Each detector shall have twin red/green status LEDs. The red LED shall indicate alarm condition and green LED shall indicate normal.
 - iii. The detector shall continually monitor any changes in sensitivity due to the environmental affects of dirt, smoke, temperature and humidity. The information shall be stored in the integral processor and transferred to the loop controller.

- iv. Detector shall be programmable for different sensitivity during day and night periods.
- v. The detector shall be suitable for direct insertion into air ducts up to 3 ft. high and 3 ft. wide with air velocities up to 5,000 ft/min.
- vi. The detector shall be rated for ceiling installation at a minimum of 30 foot centers.
- vii. The percent smoke obscuration per foot alarm setpoint for the detector shall be field selectable to various sensitive settings ranging from 1.0% to 3.5%.
- b. Detector Mounting Bases
 - i. Detector mounting bases shall be suitable for mounting on a standard 4" square electrical outlet box. The base shall contain no electronics, support all detector types and have the following minimum requirements:
 - 1. Removal of the respective detector shall not affect communications with other detectors.
 - 2. Terminal connections shall be made on the room side of the base. Bases which must be removed to gain access to the terminals shall not be acceptable.
 - 3. Capable of supporting a remote LED indicator and test station. Provide remote LED indicators and test stations as indicated on the Drawings.
 - c. Detector Mounting Plates
 - i. Provide detector mounting plate assemblies to facilitate mounting detectors for direct insertion into low velocity ductwork. The mounting plate shall be code gauge steel with corrosion resistant red enamel finish.
 - d. Duct Smoke Detectors
 - i. Air duct mounted smoke detectors shall be provided in the air supply stream of all central air handling equipment above 2000 cfm, i.e. Provide all necessary interface wiring for proper system operation.
 - ii. The duct smoke detector shall be UL listed per UL 268A specifically for use in air handling systems. The detector shall operate at velocities of 300-4000 ft./min. The detector housing shall be equipped with an integral mounting base. It shall be capable of local testing via magnetic switch or remote testing using a remote test station. The

duct detector housing shall incorporate an airtight smoke chamber in compliance with UL 268A. The housing shall be capable of mounting to either rectangular or round ducts without adaptor brackets. An integral filter system shall be included to reduce dust and residue effects on detector housing, thereby reducing maintenance and servicing. Sampling tubes shall be easily installed after the housing is mounted to the duct by passing through the duct housing. The housing shall have a red enamel finish.

- iii. For each duct smoke detector provide a remote LED indicator and test station to be mounted in a location indicated on the Drawings and approved by the local authority having jurisdiction.
- iv. F. Beam Type Smoke Detectors

1. Provide projected beam type smoke detectors. Then beam detectors shall be four wire 24 Vdc and powered from the control panel 4 wire smoke power source. This unit shall consist of a separate transmitter and receiver capable of being powered separately or together. This unit shall operate in either a short range of 30 to 100 ft. (9.14 to 30.4m) or a long range of 100 to 300 ft. (30.4 to 91.4m). The detector shall feature a bank of four alignment LEDs on both the receiver and transmitter that are used to ensure proper alignment without the use of special tools. The beam detector shall feature automatic gain control which will compensate for gradual signal deterioration from dirt accumulation on lenses. Ceiling or mount as shown on the plans. Testing shall be carried out using calibrated test filters. Provide an activated remote test station>.

b) SYSTEM MODULES

- a. Addressable intelligent modules shall support supervised Class A circuits. The modules shall be multi-function capable of field programming. The modules shall have a minimum of 2 diagnostic LEDs mounted behind a finished cover plate. A green LED shall flash to confirm communication with the loop controller. A red LED shall flash to display alarm status. The module shall be capable of storing diagnostic codes which can be retrieved for troubleshooting assistance. Input and output circuit

- wiring shall be supervised for open and ground faults. The module shall be suitable for operation in the following environment:
- i. Temperature: 32°F to 120°F (0°C to 49°C)
 - ii. Humidity: 0-93% RH, non-condensing
- b. Single Input Module
 - i. Addressable intelligent single input modules shall be provided as required for the system configuration. The single input module shall provide one (1) supervised Class A input circuit. The module shall be suitable for mounting on 4" square electrical box. The single input module shall support the following input circuit types:
 - 1. Normally-Open Alarm Latching (Manual Stations, Smoke Detectors, etc.)
 - 2. Normally-Open Alarm Delayed Latching (Waterflow Switches)
 - 3. Normally-Open Active Non-Latching (Monitors, Fans, Dampers, Doors, etc.)
 - 4. Normally-Open Active Latching (Supervisory, Tamper Switches)
 - c. Dual Input Module
 - 1. Addressable intelligent dual input modules shall be provided as required for the system configuration. The dual input module shall provide two (2) supervised CLASS A input circuits. The module shall be suitable for mounting on a standard 4" square electrical box. The dual input module shall support the following input circuit types:
 - 2. Normally-Open Alarm Latching (Manual Stations, Smoke Detectors, etc.)
 - 3. Normally-Open Alarm Delayed Latching (Waterflow Switches)
 - 4. Normally-Open Active Non-Latching (Monitors, Fans, Dampers, Doors, etc.)
 - 5. Normally-Open Active Latching (Supervisory, Tamper Switches)
 - d. Monitor Module
 - 1. Addressable intelligent monitor modules shall be provided as required for the system configuration. The monitor module shall support one (1) supervised Class A normally-open active non-latching monitor circuit. The monitor module shall be suitable for mounting on a standard 4" square electrical box.
- e. Waterflow/Tamper Module
 - 1. Addressable intelligent waterflow/tamper modules shall be provided as required for the system configuration. The waterflow/tamper module shall support two (2) supervised Class A input circuits. Channel A shall support a normally-open alarm delayed latching waterflow switch circuit. Channel B shall support a normally-open active latching tamper switch. The waterflow/tamper module shall be suitable for mounting on a standard 4" square electrical box.
 - f. Single Input Signal Module
 - 1. Addressable intelligent single input signal modules shall be provided as required for the system configuration. The single input signal module shall provide one (1) supervised Class A output circuit capable of supporting the operation of an audible/ visual signal power selector and a telephone power selector with ring tone for fire fighter's telephone. The module shall be suitable for mounting on a standard 4" square electrical box.
 - g. Dual Input Signal Module
 - 1. Addressable intelligent dual input signal modules shall be provided as required for the system configuration. The dual input signal module shall provide a means to selectively connect one of two (2) signaling circuits to one (1) supervised output circuit. The dual input signal modules shall be capable of supporting the operation of an audible/visual signal power selector. The module shall be suitable for mounting on a standard 4" square electrical box.
 - h. Control Relay Module
 - 1. Addressable intelligent control relay modules shall be provided as required for the system configuration. The control relay module shall provide one form "C" dry relay contact rated at 2 amps @ 24 Vdc to control external appliances or

equipment shutdown. The control relay shall be rated for pilot duty and releasing systems. The position of the relay contact shall be confirmed by the system firmware. The control relay module shall be suitable for mounting on a standard 4" square electrical box.

- i. Universal Class A Module
 - i. Addressable intelligent class A modules shall be provided as required for the system configuration. The universal class A module shall be capable of numerous operations. The module shall be suitable for mounting on a standard 4" square electrical box. The universal class A module shall support the following circuit types:
 1. Two (2) supervised Class A Normally-Open Alarm Latching.
 2. Two (2) supervised Class A Normally-Open Alarm Delayed Latching.
 3. Two (2) supervised Class A Normally-Open Active Non-Latching.
 4. Two (2) supervised Class A Normally-Open Active Latching.
 5. One (1) form "C" dry relay contact rated at 2 amps @ 24 Vdc.
 6. One (1) supervised Class A Normally-Open Alarm Latching.
 7. One (1) supervised Class A Normally-Open Alarm Delayed Latching.
 8. One (1) supervised Class A Normally-Open Active Non-Latching.
 9. One (1) supervised Class A Normally-Open Active Latching.
 10. One (1) supervised Class A 2-wire Smoke Alarm Non-Verified.
 11. One (1) supervised Class A 2-wire Smoke Alarm Non-Verified.
 12. One (1) supervised Class A 2-wire Smoke Alarm Verified
 13. One (1) supervised Class A 2-wire Smoke Alarm Verified
 14. One (1) supervised Class A Signal Circuit, 24Vdc @ 2A.
 15. One (1) supervised Class A Signal Circuit, 24Vdc @ 2A.

c) MANUAL PULL STATIONS

- a. Addressable intelligent dual action, non-break glass type, key reset, semi-

flush mounted manual pull stations shall be provided as indicated on the Drawings. The stations shall be of Lexan construction, finished in red with white molded raised letters "PULL IN CASE OF FIRE". The station shall be suitable for mounting on a standard 4" square electrical box. The station shall have a minimum of 2 diagnostic LEDs mounted on their integral, factory assembled single or two stage input module. A green LED shall flash to confirm communication with the loop controller. A red LED shall flash to display alarm status. The station shall be capable of storing diagnostic codes which can be retrieved for troubleshooting assistance. Input circuit wiring shall be supervised for open and ground faults. The fire alarm pull station shall be suitable for operation in the following environment:

- i. Temperature: 32°F to 120°F (0°C to 49°C)
- ii. Humidity: 0-93% RH, non-condensing

d) NOTIFICATION APPLIANCES

- a. General
 - i. All appliances shall be UL listed for Fire Protective Service. All audible appliances, visual appliances and combination audible/visual appliances shall be capable of providing the equivalent facilitation which is allowed under the Americans with Disabilities Act Accessibilities Guidelines (ADA/AG), and shall be UL 1971, and ULC S526 listed.
 - b. Audible Only Notification Appliances
 - i. Audible appliances shall be a mylar cone type speaker. Paper type cones are not acceptable. The rear of the speaker shall be completely sealed protecting the cone during and after installation. Speakers shall provide power taps at 1/4w, 1/2w, 1w, and 2w. Speakers shall provide UL confirmed 90 dBA sound output at 2w.
 - ii. Audible appliances shall be provided with in/out wiring terminals.
 - iii. Audible appliances shall be flush for ceiling mounted and flush/semi-flush for wall mounted as indicated on the Drawings. They shall have a white faceplate for ceiling mounting and red faceplate for wall mounting. They shall mount to a standard 4" square electrical box.
 - c. Visual Only Notification Appliances
 - i. Visual appliances shall be a self-

synchronized strobe. The strobe flashtube shall be enclosed in a rugged lexan lens with solid state circuitry. The strobe shall provide 15, 15/75, 30, 60 and 110 candela synchronized flash outputs. The strobe intensity selection shall be based on the installed location within the building.

- ii. Visual appliances shall be provided with in/out field wiring terminals.
- iii. Visual appliances shall have lens markings oriented for wall mounting where indicated on the Drawings. They shall have a red faceplate for flush/semi-flush wall mounting. They shall mount to a standard 4" square electrical outlet box.
- d. Combination Audible/Visual Notification Appliances
 - i. Combination appliances shall be a combination of the audible and visual appliances specified previously. They shall have a red faceplate for flush/semi-flush wall mounting.
 - ii. The majority, if not all, of the notification appliances shall be combination devices such that the visual and audible requirements of ADA shall be complied with. Visual notification appliances shall be located in all areas of common use, i.e. lobbies, hallways, restrooms, meeting/conference/assembly areas, break rooms, copy/fax/mail rooms, etc. Audible notification appliances shall produce a sound that exceeds the prevailing equivalent sound level in the room or space by at least 15dbA or exceeds any maximum sound level with a duration of 60 seconds by 5dbA, whichever is louder. Sound levels for alarm signals shall not exceed 120 dbA. It is the intent of the Drawings to show all devices that are required. The fire alarm system vendor/bidder shall provide all appliances shown and/or required by these specifications but if others are anticipated to be required the vendor/bidder shall qualify the provisions for the system making note of the additional cost for the anticipated additional requirements.

e) ANCILLARY DEVICES

- a. Remote Relays
 - i. Multi-Voltage Control Relays
 - 1. Remote control relays shall be provided as required for the system configuration for

connection to supervised ancillary circuits for control of fans, dampers, door releases, etc. Relay contact ratings shall be SPDT or DPDT, as required, and rated for 10 amperes at 115 Vac. A single relay may be energized from a voltage source of 12 Vdc, 12 Vac, 24 Vdc, 24 Vac, 115 Vac, or 230 Vac, as required. A red LED shall indicate the relay is energized. A metal enclosure shall be provided.

ii. Manual Override Control Relays

- 1. Remote control relays with a manual override shall be provided as required for the system configuration for connection to supervised ancillary circuits for control of fans, dampers, door releases, etc. Relay contact ratings shall be SPDT and rated for 10 amperes at 115 Vac or 24 Vdc. A single relay may be energized from a voltage source of 24 Vdc or 24 Vac. A red LED shall indicate the relay is energized.

iii. Heavy Duty Power Relays

- 1. Remote control relays shall be provided as required for the system configuration for connection to supervised ancillary circuits for control of fans, dampers, door releases, etc. Relay contact ratings shall be DPDT and rated for 30 amperes at 300 Vac or 2 HP motor load. A single relay may be energized from a voltage source of 24 Vac, 115 Vac, as required. A metal enclosure shall be provided.

f) ELECTROMAGNETIC DOOR HOLDERS

- a. Provide single or double door, floor or wall mounted electromagnetic door holder/release devices as indicated on the Drawings. The devices shall be rated for 24V ac/dc input. The devices shall be brushed zinc finished.

g) FIRE ALARM CABLE

- a. The fire alarm cable shall plenum rated and be UL listed and suitable for use as power limited fire protective signaling circuit cable in accordance with National Electric Code Article 760 (Fire Alarm Systems) and Article 725 (Class 1, Class 2 and Class 3 - Remote Control, Signaling

- and Power-Limited Circuits).
- b. Cable Construction
 - i. Conductors shall be solid, soft annealed, uncoated copper.
 - ii. Insulation shall be 300 volt, 105°C polyvinylchloride.
 - iii. Two conductor, non-shielded cables shall be parallel; shielded and three or more conductors shall be cabled round.
 - iv. Shielding shall be mylar backed aluminum foil, helically wrapped to provide 100% coverage. A suitable copper drain wire shall be provided with shielded cables.
 - v. Jacket shall be red, 105°C polyvinylchloride, rated 300 volt.
 - vi. Cable shall be plenum rated when installed in air handling plenums.
- c. In general, non-shielded cable is acceptable for use throughout except on voice circuits. All voice circuits shall utilize shielded, twisted pair cable.

PART 3 - EXECUTION**3.1 APPROVALS**

- A. Complete fire alarm system drawings shall be issued to the Local Authority Having Jurisdiction for approval prior to the installation of the fire alarm system.

3.2 INSTALLATION

- A. Installation of the Fire Alarm System shall be in strict compliance with manufacturers recommendations. The entire system shall be installed in accordance with approved manufacturers manuals and wiring diagrams and as approved by the Local Authority Having Jurisdiction.
- B. Fire alarm cable shall be installed in conduit in areas of exposed structure and within inaccessible ceilings. Conduit shall also be provided from outlet boxes within walls stubbed up to accessible ceilings. Provide **end bushings** on conduit stub-ups. Cable only is acceptable in accessible ceilings.
- C. All conduit, wiring, outlet boxes, junction boxes, cabinets and similar devices necessary for the complete installation shall be included as part of the system. All junction box blank coverplates shall be labeled with a red "F.A." for identification purposes.
- D. All wiring shall be color coded throughout.
- E. The system shall be installed and fully tested under the supervision of trained manufacturer's representatives. The system shall be demonstrated to perform all the functions as specified.

END OF SECTION

DIVISION 31

EARTHWORK

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SECTION 31 05 13

SOILS FOR EARTHWORK

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Subsoil materials.
 - 2. Topsoil materials.
- B. Related Sections:
 - 1. Section 310513 - Aggregates for Earthwork.
 - 2. Section 320516 - Aggregates for Exterior Improvements.
 - 3. Section 312213 - Rough Grading.
 - 4. Section 312323 - Backfill.
 - 5. Section 312317 - Trenching.

1.2 REFERENCES

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. ASTM International:
 - 1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - 2. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft³ (2,700 kN-m/m³)).

- 3. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

PART 2 PRODUCTS

2.1 SOURCE QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Testing and Inspection Services Testing and analysis of soil material.
- B. Testing and Analysis of Subsoil Material: Perform in accordance with ASTM D698.
- C. Testing and Analysis of Topsoil Material: Perform in accordance with ASTM D698.
- D. When tests indicate materials do not meet specified requirements, change material and retest.
- E. Furnish materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.1 EXCAVATION

- A. Excavate subsoil and topsoil from areas designated. Strip topsoil to full depth of topsoil in designated areas.
- B. Stockpile excavated material meeting requirements for subsoil materials and topsoil materials.
- C. Remove excess excavated materials subsoil and topsoil not intended for reuse, from site.

- D. Remove excavated materials not meeting requirements for subsoil materials and topsoil materials from site.

3.2 STOCKPILING

- A. Stockpile materials on site at locations designated by Architect/Engineer.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Separate differing materials with dividers or stockpile apart to prevent mixing.
- D. Prevent intermixing of soil types or contamination.
- E. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.3 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

END OF SECTION

SECTION 31 10 00

SITE CLEARING

PART 1 GENERAL

PART 2

2.1 SUMMARY

- A. Section Includes:
 - 1. Removing surface debris.
 - 2. Removing designated trees, shrubs, and other plant life.
 - 3. Removing abandoned utilities.
 - 4. Excavating topsoil.
- B. Related Sections:
 - 1. Section 312213 - Rough Grading.
 - 2. Section 312318 - Rock Removal.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 013000 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify existing plant life designated to remain is tagged or identified.
- C. Identify waste area for placing removed materials.

3.2 PREPARATION

- A. Call Local Utility Line Information not less than three working days before performing Work.

- 1. Request underground utilities to be located and marked within and surrounding construction areas.

3.3 PROTECTION

- A. Locate, identify, and protect utilities indicated to remain, from damage.
- B. Protect trees, plant growth, and features designated to remain, as final landscaping
- C. Protect bench marks, survey control points, and existing structures from damage or displacement.

3.4 CLEARING

- A. Clear areas required for access to site and execution of Work.
- B. Remove trees and shrubs within marked areas. Remove stumps.
- C. Clear undergrowth and deadwood, without disturbing subsoil.
- D. Apply herbicide to remaining stumps to inhibit growth.

3.5 REMOVAL

- A. Remove debris, rock, and extracted plant life from site.
- B. Remove abandoned utilities. Indicated removal termination point for underground utilities on Record Documents.

- C. Continuously clean-up and remove waste materials from site. Do not allow materials to accumulate on site.
- D. Do not burn or bury materials on site. Leave site in clean condition.

3.6 TOPSOIL EXCAVATION

- A. Excavate topsoil from areas to be further excavated, relandscaped, or regraded, without mixing with foreign materials for use in finish grading.
- B. Do not excavate wet topsoil.
- C. Stockpile in area designated on site to depth not exceeding 8 feet and protect from erosion.
- D. Remove excess topsoil not intended for reuse, from site.

END OF SECTION

SECTION 31 22 13

ROUGH GRADING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Excavating topsoil.
 2. Excavating subsoil.
 3. Cutting, grading, filling, compacting site for site structures, building pads.
- B. Related Sections:
1. Section 310513 - Soils for Earthwork: Soils for fill.
 2. Section 310516 - Aggregates for Earthwork: Aggregates for fill.
 3. Section 311000 - Site Clearing: Excavating topsoil.
 4. Section 312316 - Excavation and Fill: Building excavation.
 5. Section 312318 - Rock Removal.
 6. Section 312323 - Backfill: General building area backfilling.
 7. Section 312317 - Trenching: Trenching and backfilling for utilities.

1.2 REFERENCES

- A. American Association of State Highway and Transportation Officials:
1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. ASTM International:

1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
3. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
4. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft³ (2,700 kN-m/m³)).
5. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
6. ASTM D2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
7. ASTM D2434 - Standard Test Method for Permeability of Granular Soils (Constant Head).
8. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
9. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

PART 2 EXECUTION**2.1 PREPARATION**

- A. Call Local Utility Line Information service not less than three working days before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum.
- C. Protect utilities indicated to remain from damage.
- D. Protect bench marks, survey control point, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

2.2 FILLING

- A. Fill areas to contours and elevations with unfrozen materials.

- B. Place fill material in continuous layers and compact as required.
- C. Maintain optimum moisture content of fill materials to attain required compaction density.
- D. Slope grade away from building minimum 2 percent slope for minimum distance of 10 ft, unless noted otherwise.
- E. Make grade changes gradual. Blend slope into level areas.

2.3 FIELD QUALITY CONTROL

- A. Perform in place compaction tests in accordance with the following:
 - 1. As required by geotechnical engineer.

END OF SECTION

SECTION 31 23 16

EXCAVATION AND FILL

PART 1 GENERAL

PART 2

2.1 SUMMARY

- A. Section Includes:
 - 1. Soil densification.
 - 2. Excavating for building foundations.
 - 3. Excavating for slabs-on-grade.
 - 4. Excavating for site structures.
- B. Related Sections:
 - 1. Section 310513 - Soils for Earthwork: Stockpiling excavated materials.
 - 2. Section 310516 - Aggregates for Earthwork: Stockpiling excavated materials.
 - 3. Section 312213 - Rough Grading: Topsoil and subsoil removal from site surface.
 - 4. Section 312318- Rock Removal: Removal of rock during excavating.
 - 5. Section 312323- Backfill.
 - 6. Section 312317 - Trenching: Excavating for utility trenches.

2.2 REFERENCES

- A. ASTM International:
 - 1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - 2. ASTM D1556 - Standard Test Method for Density

- of Soil in Place by the Sand-Cone Method.
- 3. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
- 4. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- B. Local utility standards when working within 24 inches of utility lines.

PART 3 EXECUTION

3.1 EXCAVATION

- A. Underpin adjacent structures which may be damaged by excavation work.
- B. Excavate subsoil to accommodate building foundations, slabs-on-grade.
- C. Excavate to working elevation for piling work.
- D. Compact disturbed load bearing soil in direct contact with foundations to original bearing capacity; perform compaction in accordance with Section 02320 and Section 02324.
- E. Grade top perimeter of excavation to prevent surface water from draining into excavation.

- F. Trim excavation. Remove loose matter.
- G. Notify Architect/Engineer of unexpected subsurface conditions.
- H. Correct areas over excavated with structural fill.
- I. Remove excess and unsuitable material from site.
- J. Repair or replace items indicated to remain damaged by excavation.

3.2 PROTECTION

- A. Prevent displacement or loose soil from falling into excavation; maintain soil stability.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.
- C. Protect structures, utilities and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth operations.

END OF SECTION

SECTION 31 31 16

TERMITE CONTROL

PART 1 GENERAL**1.1 SUMMARY**

- A. Section Includes:
 - 1. Soil treatment for termite control.
- B. Related Sections:
 - 1. Section 310513 - Soils for Earthwork: Backfill materials.
 - 2. Section 312316 - Excavation and Fill: Subgrade preparation.
 - 3. Section 033000 - Cast-In-Place Concrete: Slabs on grade and foundations placed over treated soil.

1.2 REFERENCES

- A. Environmental Protection Agency:
 - 1. EPA FIFRA - Federal Insecticide, Fungicide and Rodenticide Act.
- B. National Pest Management Association:
 - 1. NPMA WDO - Wood Destroying Organism Library.

1.3 SUBMITTALS

- A. Product Data: Submit toxicants to be used, composition by percentage, dilution schedule, intended application rate. Include product label information.
- B. Test Reports: Indicate regulatory agency approval reports.

- C. Manufacturer's Application Instructions: Indicate caution requirements and in accordance with current product label of chosen pesticide.
- D. Certify applications followed NPMA WDO for termite control or other regional location guidance.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record moisture content of soil before application, date and rate of application, areas of application, diary of toxicity meter readings and corresponding soil coverage.
- B. Operation and Maintenance Data: Indicate re-treatment schedule.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Applicator: Company specializing in performing the Work of this section and licensed in State of Texas.

1.6 SEQUENCING

- A. Section 011000 - Summary: Work sequence.
- B. Apply toxicant immediately prior to installation of vapor barrier under slabs-on-grade in accordance with product label supplemented by the NPCA's

ARP for termiticiding or local requirements.

1.7 WARRANTY

- A. Warranty: Include coverage for damage and repairs to building and building contents caused by termites. Repair damage. Re-treat where required.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Toxicant Chemical: EPA FIFRA approved; synthetically color dyed to permit visual identification of treated soil.
- B. Diluent: Recommended by toxicant manufacturer.

2.2 MIXES

- A. Mix toxicant to manufacturer's instructions.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 013000 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify soil surfaces are unfrozen, sufficiently dry to absorb toxicant, and ready to receive treatment.
- C. Verify final grading and excavation are complete.

3.2 APPLICATION

- A. Apply toxicant at locations indicated in Schedule at end of section.
- B. Apply extra treatment to structure penetration surfaces including pipe or ducts, and soil penetrations including grounding rods or posts.
- C. Re-treat disturbed treated soil with same toxicant as original treatment.
- D. When inspection or testing identifies presence of termites, re-treat soil and re-test.

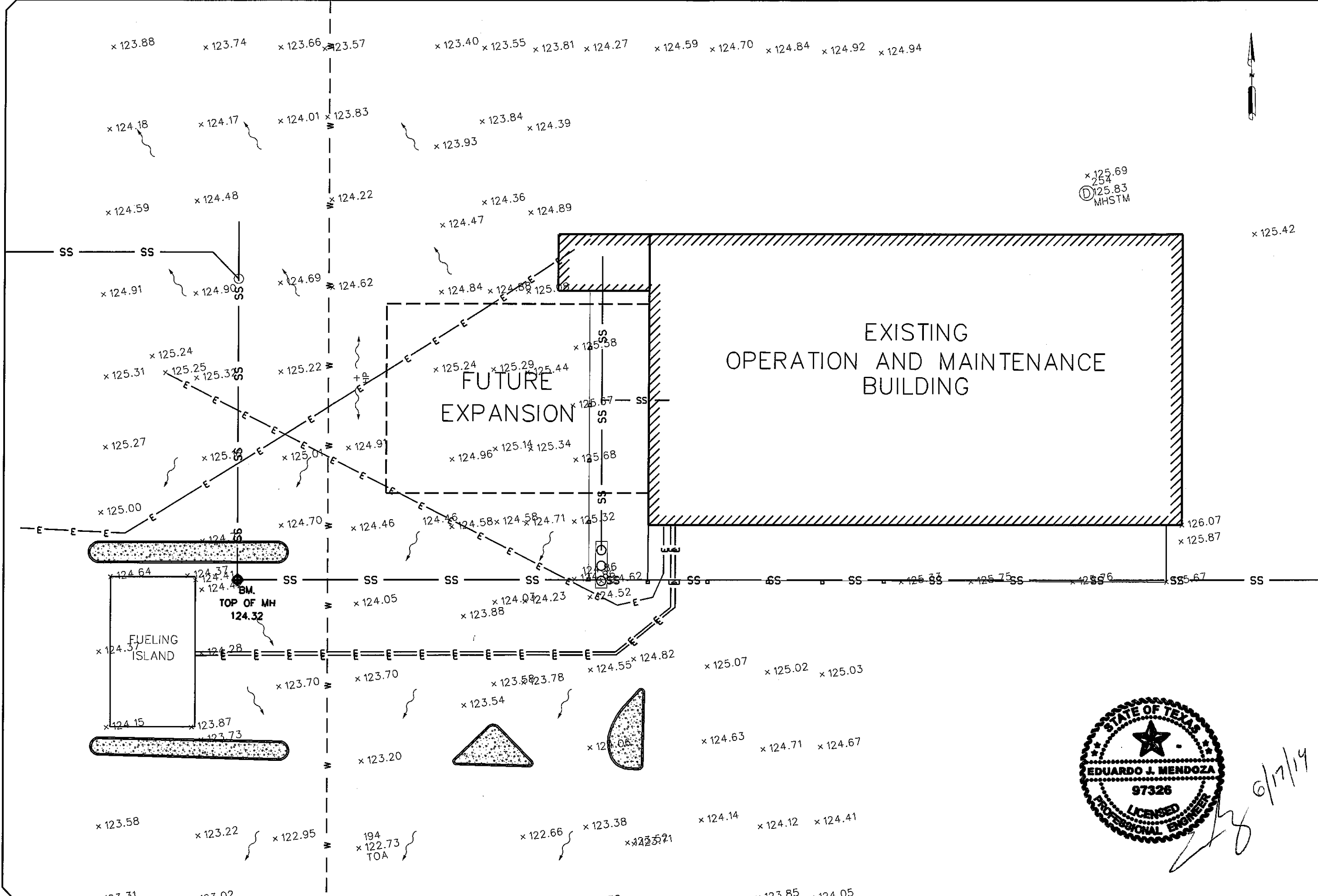
3.3 PROTECTION OF FINISHED WORK

- A. Section 017000 - Execution Requirements: Protecting finished Work.
- B. Do not permit soil grading over treated work.

END OF SECTION

N. DRAWINGS

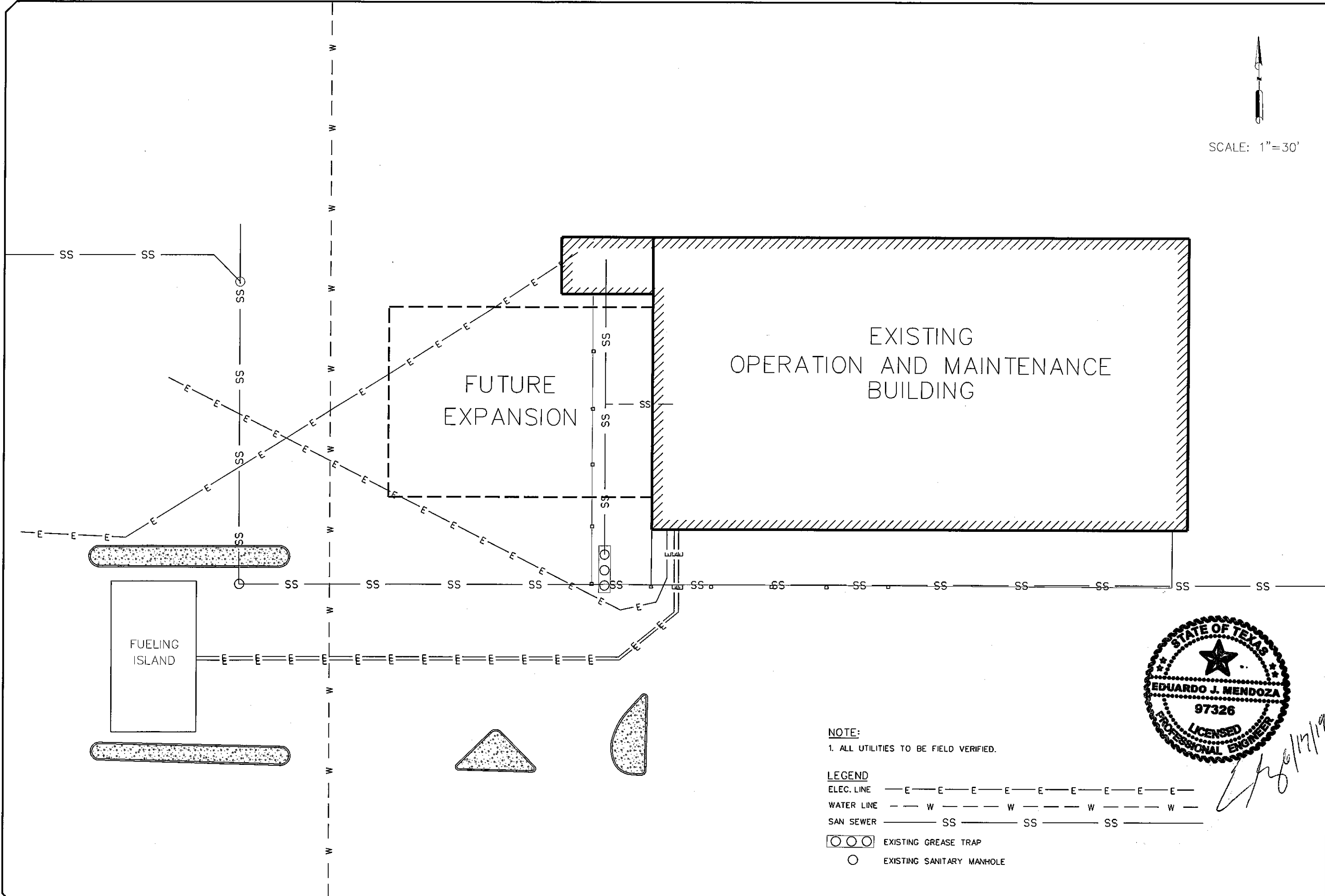
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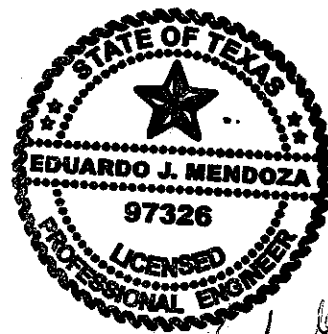
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DRAWN BY: R.R.R.	
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CITY OF McALLEN ENGINEERING DEPARTMENT	
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NOTE:
1. ALL UTILITIES TO BE FIELD VERIFIED.

LEGEND
ELEC. LINE — E — E — E — E — E — E — E — E — E —
WATER LINE — — W — — — W — — — W — — — W — —
SAN SEWER — — — SS — — — SS — — — SS — — —
○ ○ ○ ○ EXISTING GREASE TRAP
○ EXISTING SANITARY MANHOLE

FILE NAME:	FILE NAME
DATE:	04.10.2019
SURVEYED BY:	SURVEYOR
DESIGNED BY:	DESIGNER
DRAWN BY:	R.R.R.
CHECKED BY:	CHECKED
PROJECT NO:	PROJECT

AUTOMOTIVE WAREHOUSE
EXPANSION & ELEVATOR
UTILITY PLAN



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DESIGNED BY:	DESIGNER
DRAWN BY:	R.R.R.
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AUTOMOTIVE WAREHOUSE
EXPANSION & ELEVATOR

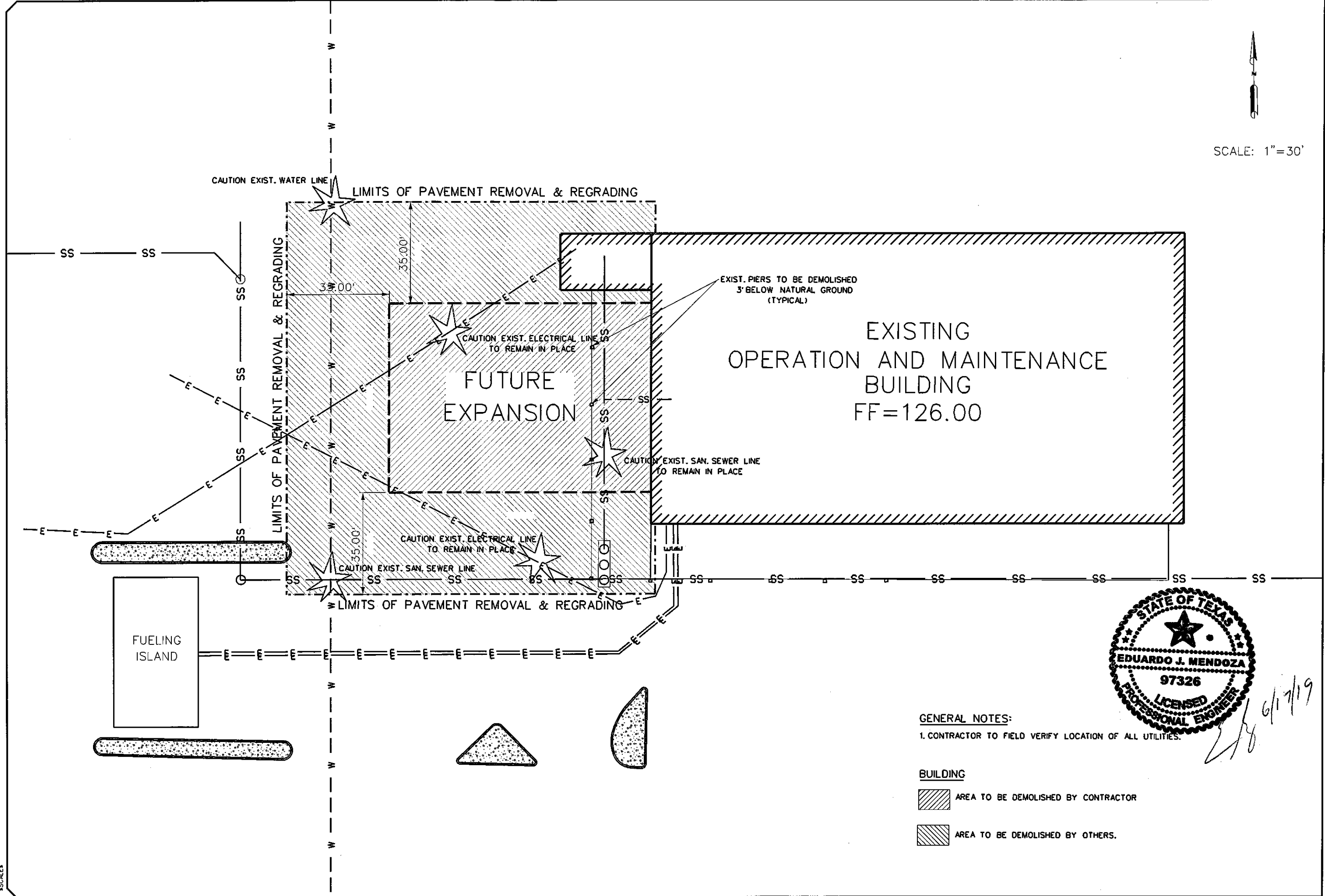
DEMOLITION PLAN

CITY OF
MCALLEN
ENGINEERING DEPARTMENT

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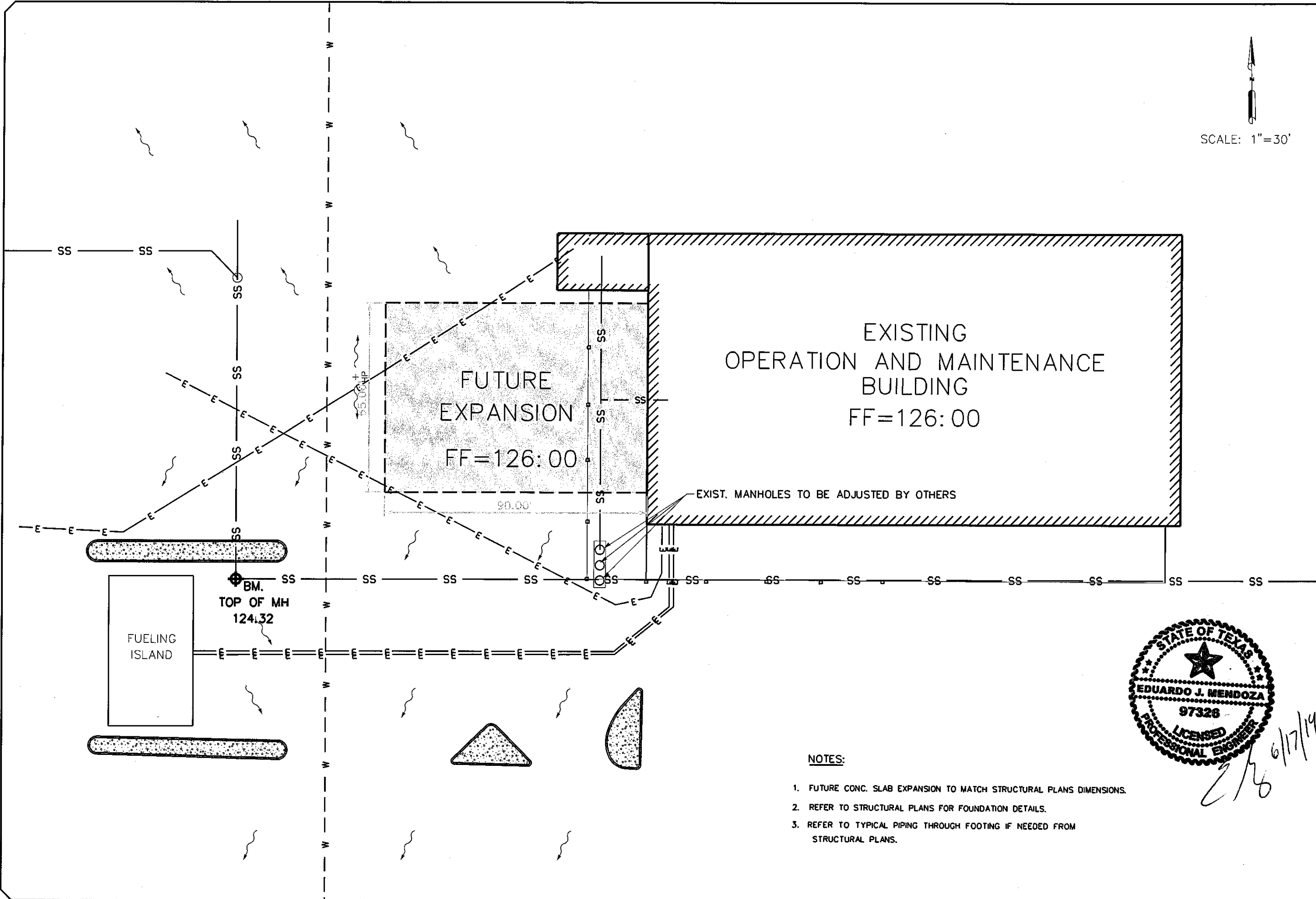
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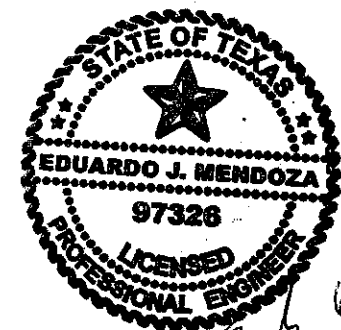
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NOTES:

1. FUTURE CONC. SLAB EXPANSION TO MATCH STRUCTURAL PLANS DIMENSIONS.
2. REFER TO STRUCTURAL PLANS FOR FOUNDATION DETAILS.
3. REFER TO TYPICAL PIPING THROUGH FOOTING IF NEEDED FROM STRUCTURAL PLANS.



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DESIGNED BY: DESIGNER	
DRAWN BY: R.R.R.	
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CITY OF MCALLEN ENGINEERING DEPARTMENT	
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CITY OF McALLEN
DEPARTMENT OF PUBLIC WORKS
AUTOMOTIVE WAREHOUSE EXPANSION & ELEVATOR

OWNER

CITY OF McALLEN

1300 HOUSTON AVENUE
McALLEN, TEXAS 78501

TEL 956.681.3111



ARCHITECT
NEGRETE & KOLAR ARCHITECTS, LLP

204 EAST STUBBS
EDINBURG, TEXAS 78539

TEL.956.386.0611
WWW.NEKOARCH.COM

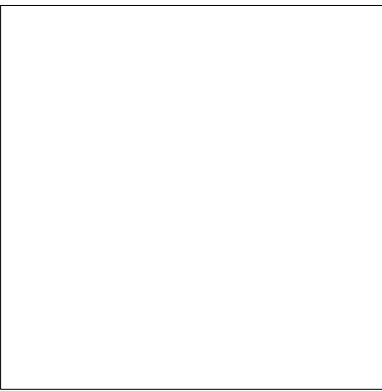
STRUCTURAL ENGINEER

CHANIN ENGINEERING, LLC
400 W NOLANA AVE #H.TEL. 956.687.9421
McALLEN, TEXAS 78504 FAX. 956.687.3211



M - E - P ENGINEER

TRINITY MEP ENGINEERING
3533 E MORELAND DR TEL. 956.973.0500
WESLACO, TEXAS 78596



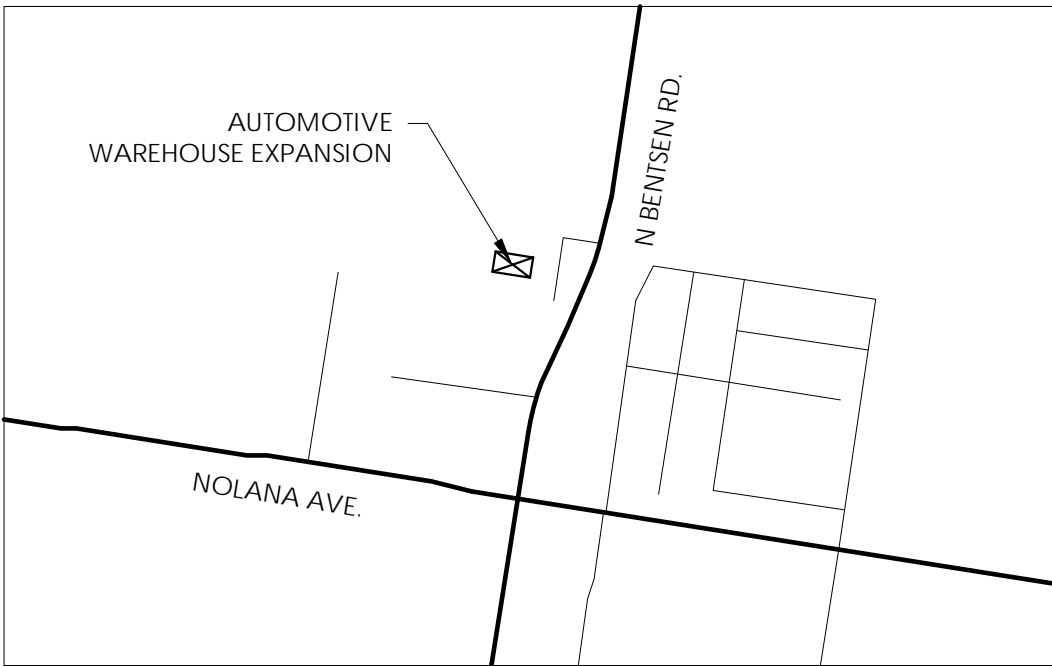
CIVIL ENGINEER

CITY OF McALLEN
311 N 15TH ST TEL. 956.681.3111
McALLEN, TEXAS 78501



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JAVIER VILLALOBOS	COMMISSIONER
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JOHN INGRAM	COMMISSIONER
VERONICA WHITACRE	COMMISSIONER
ROEL RODRIGUEZ, P.E.	CITY MANAGER



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	G.001	DRAWING INDEX, NOTES & SYMBOLS			
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				M1.2	MECHANICAL FLOOR PLANS
	D.100	DEMOLITION FLOOR PLAN		E0.0	ELECTRICAL LEGEND
	D.200	DEMOLITION EXTERIOR ELEVATIONS		ES1.1	ELECTRICAL SITE LIGHTING PLAN
	D.400	DEMO REFLECTED CEILING PLAN		ED1.0	ELECTRICAL LIGHTING DEMO FLOOR PLAN
Civil	- - -	BY OWNER		ED2.0	ELECTRICAL POWER DEMO FLOOR PLAN
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	S.901	DETAILS			
	S.902	DETAILS			
	M0.0	MECHANICAL NOTES AND LEGEND			
	MD1.0	MECHANICAL DEMO FLOOR PLAN			

11720 NORTH HIRE
AUSTIN, TEXAS 78753
PH. 512.474.6526
FAX. 512.474.6761
204 E. STUBBS
STREET
EDINBURG, TX
PH. 956.386.0611
FAX. 956.386.0613

NEGRETE & KOLAR
ARCHITECTS, LLP

WWW.NEKOARCH.COM



Project #1809

CITY OF McALLEN
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AUTO WAREHOUSE EXPANSION
McAllen, Texas

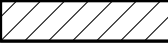


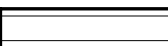


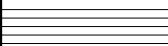
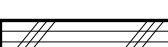
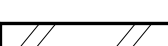
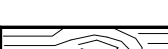


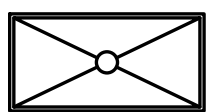
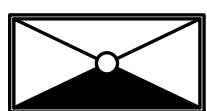

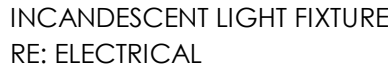



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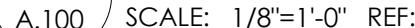






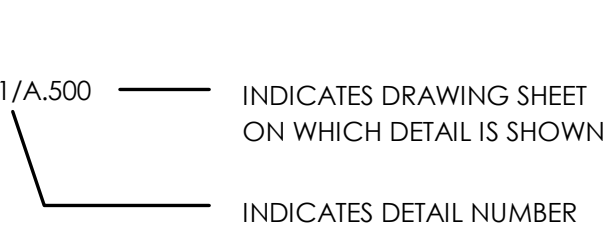


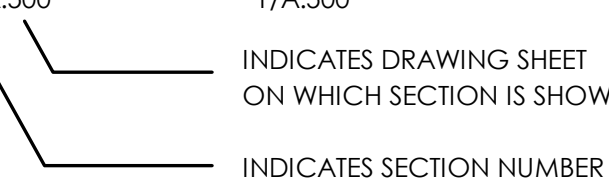

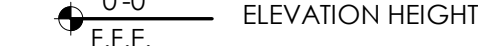


COVER SHEET

G.000

MATERIAL DESIGNATION

	BRICK
	CMU WALL
	CONCRETE
	GYP. BD. WALL
	LIMESTONE
	EARTH
	GLASS
	PLYWOOD
	STEEL
	WOOD
	DIFFUSER
	RETURN AIR
	2x4 RECESSED LENSED TROFFER RE: ELECTRICAL
	2x4 RECESSED LENSED TROFFER W/ EMERGENCY BALLAST: RE: ELECTRICAL
	INCANDESCENT LIGHT FIXTURE RE: ELECTRICAL
	INCANDESCENT LIGHT FIXTURE RE: ELECTRICAL
	EXIT LIGHT: RE: ELECTRICAL
	1X4 FLUORESCENT LIGHT FIXTURE RE: ELECTRICAL
	SPRINKLER HEAD

GRAPHIC SYMBOLS

	DRAWING TITLE
	SCALE: 1/8"=1'-0" REF:
	SCIENCE LAB/CLASS
	ROOM NUMBER
	DOOR NUMBER
	COLUMN REFERENCE GRID
	WINDOW TYPE
	PARTITION TYPE
	INDICATES DRAWING SHEET ON WHICH DETAIL IS SHOWN
	INDICATES DETAIL NUMBER
	DETAIL SECTION
	INDICATES DRAWING SHEET ON WHICH SECTION IS SHOWN
	INDICATES SECTION NUMBER
	ELEVATION HEIGHT
	REVISION
	NORTH ARROW

ABBREVIATIONS

&	AND	GA.	GAUGE	REQ.	REQUIRED
L	ANGLE	GALV.	GALVANIZED	RESIL.	RESILIENT
C	CHANNEL	G.C.	GENERAL CONTRACTOR	RET.	RETURN
@	AT	GCMU	GLAZED CMU	REV.	REVISION
<	CENTERLINE	GL.	GLASS	RFG.	ROOFING
~	DIAMETER/ROUND	GLB.	GLASS BLOCK	RFL.	REFLECT(ED)(IVE)(OR)
~	POUND OR NUMBER	GND.	GROUND	RGTR.	REGISTER
(E)	EXISTING	GNR.	GUNS N ROSES	R.H.	RIGHT HAND
		GR.	GRADE	RM.	ROOM
		GT.	GROUT	R.O.	ROUGH OPENING
		GYP.	GYP SUM	R.O.W.	RIGHT OF WAY
ABV	ABOVE				
ACOUS.	ACOUSTICAL	H.C.	HOLLOW CORE	S.C.	SOLID CORE
ADD	ADDENDUM	H.D.	HEAVY DUTY	SCHED.	SCHEDULE
ADJ.	ADJUSTABLE	HDB.	HARDBOARD	SECT.	SECTION
A.F.F.	ABOVE FINISHED FLOOR	HDR.	HEADER	SH.	SHELF
AGG.	AGGREGATE	HDW.	HARDWARE	SHR.	SHOWER
AL.	ALUMINUM	HDWD.	HARDWOOD	SHTH.	SHEATHING
ALT.	ALTERNATE	H.M.	HOLLOW METAL	SIM.	SIMILAR
APPROX.	APPROXIMATELY	HORIZ.	HORIZONTAL	SPEC.	SPECIFICATION
ARCH.	ARCHITECT(URE)	HR.	HOUR	SPK.	SPEAKER
ASB.	ASBESTOS	HT.	HEIGHT	SQ.	SQUARE
ASPH.	ASPHALT			SS.	STAINLESS STEEL
AUTO.	AUTOMATIC	I.D	INSIDE DIAMETER(DIM)	STD.	STANDARD
		INCL.	INCLUDE(D)(ING)	STL.	STEEL
BD.	BOARD	INSUL.	INSULATION	STOR.	STORAGE
BET.	BETWEEN	INT.	INTERIOR	STRUCT.	STRUCTURE
BIT.	BITUMINOUS	INV.	INVERT	SUSP.	SUSPENDED
BLDG.	BUILDING			SYM.	SYMBOL
BLK.	BLOCK	J.	JOIST	SYN.	SYNTHETIC
BM.	BEAM	JAN.	JANITOR	SYS.	SYSTEM
B.S.	BOTH SIDES	JT.	JOINT		
B.W.	BOTH WAYS			T.	TREAD
		KIT.	KITCHEN	T.C.	TOP OF CURB
CAB	CABINET			T & G	TONGUE AND GROOVE
CER.	CERAMIC			THK.	THICK
C.G.	CORNER GUARD			THR.	THRESHOLD
CHAM.	CHAMFER	L.	LENGTH	T.O.P.	TOP OF PAVEMENT
C.HT.	CEILING HEIGHT	LAB.	LABORATORY	T.O.S.	TOP OF STEEL
C.I.P.C.	CAST-IN-PLACE CONCRETE	LAD.	LADDER	T.O.W.	TOP OF WALL
CIR.	CIRCLE	LAM.	LAMINATE	TYP.	TYPICAL
CLO.	CLOSET	LAV.	LAVATORY	TZ.	TERRAZZO
CLR.	CLEAR	LBL.	LABEL		
C.M.T	CERAMIC MOSAIC TILE	L.H.	LEFT HAND		
CMU	CONCRETE MASONRY UNIT	LKR.	LOCKER		
CNTR.	COUNTER	L.P.T.	LOW POINT	UNF.	UNFINISHED
C.O.	CASE OPENING	LT.	LIGHT	U.O.N.	UNLESS OTHERWISE NOTED
COL.	COLUMN	LTL.	LINTEL		
COMB.	COMBINATION			VAR.	VARNISH
CONC.	CONCRETE	MAS.	MASONRY	VB.	VAPOR BARRIER
CONN.	CONNECTION	MAX.	MAXIMUM	V.B.	VINYL BASE
CONST.	CONSTRUCTION	MECH.	MECHANICAL	VERT.	VERTICAL
CONT.	CONTINUOUS	MEMB.	MEMBRANE	VEST.	VESTIBULE
CONTR.	CONTRACT(OR)	MFFR.	MANUFACTURER	VIN.	VINYL
CORR.	CORRIDOR	MH.	MANHOLE	V.P.	VENEER PLASTER
CPT.	CARPET	MIN.	MINIMUM	V.T.	VINYL TILE
CSMT.	CASEMENT	MIR.	MIRROR		
C.T.	CERAMIC TILE	MISC.	MISCELLANEOUS	W/	WITH
CTR.	CENTER	M.O.	MASONRY OPENING	WB.	WOOD BASE
CTSK.	COUNTERSUNK	MOD.	MODULAR	W.C.	WATER CLOSET
		MT.	MOUNT(ED)(ING)	WD.	WOOD
		MTL.	METAL	W.H.	WALL HUNG
				WIN.	WINDOW
D.	DRAIN	N.I.C.	NOT IN CONTRACT	W/O	WITHOUT
DBL.	DOUBLE	NO. OR #	NUMBER	WP.	WATER PROOF
DEMO.	DEMOLISH, DEMOLITION	NOM.	NOMINAL	W.S.	WATER STOP
DEPT.	DEPARTMENT	N.T.S.	NOT TO SCALE	WSCT.	WAINSCOT
DIA.	DIAMETER			W.W.F.	WELDED WIRE FABRIC
DIAG.	DIAGONAL			WT.	WEIGHT
DIM.	DIMENSION				
DIV.	DIVISION	O.A.	OVERALL		
DN.	DOWN	O.C.	ON CENTER		
D.O.	DOOR OPENING	OD.	OUTSIDE DIAMETER(DIM)		
DR.	DOOR	OFF.	OFFICE		
DS.	DOWNSPOUT	OPH.	OPPOSITE HAND		
DTL.	DETAIL	OPNG.	OPENINGS		
D.W.	DISHWASHER	OPP.	OPPOSITE		
DWG.	DRAWINGS				
DWR.	DRAWER	PARA.	PARALLEL		
		PART.	PARTITION		
EA.	EACH	PBD.	PARTICLE BOARD		
E.J.	EXPANSION JOINT	PED.	PEDESTAL		
ELEV.	ELEVATION	PERF.	PERFORATED		
ELEC.	ELECTRICAL	PERI.	PERIMETER		
EMER.	EMERGENCY	PL.	PLATE		
ENCL.	ENCLOSURE	P.L.	PROPERTY LINE		
EQUIP.	EQUIPMENT	P.LAM.	PLASTIC LAMINATE		
ESTM.	ESTIMATE	PLAS.	PLASTER		
EXH.	EXHAUST	PLYWD.	PLYWOOD		
EXP.	EXPANSION	PR.	PAIR		
EXPO.	EXPOSED	PRCST.	PRE-CAST		
EXT.	EXISTING	PT.	PAINT		
		PVMT.	PAVEMENT		
		Q.T.	QUARRY TILE		
F.B.	FACE BRICK				
F.B.O.	FURNISHED BY OTHERS	R	RISER		
F.D.	FLOOR DRAIN	RAD.	RADIUS		
FDN.	FOUNDATION	R.B.	RUBBER BASE		
F.F.	FINISH FLOOR	R.D.	ROOF DRAIN		
FGL.	FIBERGLASS	REF.	REFERENCE		
FIN.	FINISH(ED)	REFR.	REFRIGERATOR		
FL.	FLOOR	REINF.	REINFORCED		
FLASH.	FLASHING				
F.O.C.	FACE OF CONCRETE				
F.O.F.	FACE OF FINISH				
F.O.M.	FACE OF MASONRY				
F.O.S.	FACE OF STUDS				
FR.	FRAME				
FT.	FOOT OR FEET				
FTS.	FOOTING				
FURR.	FURRING				

REFERENCE NOTES FULL LIST

03 30 005	Cast-In-Place Concrete, Re: Struct
04 05 03	Masonry Mortaring and Grouting
04 20 00.A0	CMU
04 20 00.A16	8" x 8" x 16" CMU
04 20 00.B	CMU Bond Beam
04 20 00.E	
04 20 00.J	
04 20 00.Y0	Reinforcing Steel, Re: Struct.
05 12 00	Structural Steel, Re:Struct.
05 12 00.B0	C Shape Structural Steel, Re: Struct.
05 12 00.L0	Hollow Steel Section, Re: Struct.
05 12 23	Structural Steel for Buildings Re: Struct.
05 50 00	Metal Fabrications
05 50 00.A0	Pipe Bollard
06 10 00.A2	Wood Blocking As Required
06 10 00.D0	2x4
06 10 00.F1	2x6 Framing
06 10 00.P9	3/4" Plywood Sheathing
06 11 00.G1	
06 16 00.D0	Plywood
06 16 00.D8	5/8" Plywood
06 16 00.D11	3/4" Plywood
07 19 00	Water Repellants
07 21 13.A6	2-1/2" Rigid Board Insulation
07 21 16	Blanket Insulation
07 21 16.16	Insulating Liner System
07 21 16.A0	Sound Batt Insulation
07 21 19a	Foamed-In-Placed Insulation
07 21 19a.A2	Closed Cell Polyurethane Spray Foam Insulation, 1-1/2", min. R-10.3
07 21 19a.B1	Open Cell Polyurethane Spray Foam Insulation, 1", min. R-3.7
07 27 00	Air Barriers
07 42 13	Metal Wall Panels
07 61 00	Sheet Metal Roofing
07 61 00.A0	Standing Seam Seamed Roofing Panel
07 61 00.F0	Roofing Clip
07 61 00.F3	Z Closure
07 61 00.F6	Fastener
07 61 00.G1	Ridge/Hip Cap
07 61 00.G3	Eave Flashing
07 62 00	Sheet Metal Flashing and Trim
07 62 00.C0	Metal Formed Trim
07 71 23	Gutters and Downspouts
07 71 23.N0	Gutter - Profile as Indicated
07 71 23.T1	Downspout Strap
07 90 00	Joint Protection
08 12 13.13	Standard Hollow Metal Frames
08 12 14.A	
08 12 14.B	
08 13 13.13	Standard Hollow Metal Doors
08 13 13.13.A0	Standard Hollow Metal Door
08 14 16	Flush Wood Doors
08 33 23	Overhead Coiling Doors
08 34 63.13	
08 41 13.A	
08 51 23	Steel Windows
08 71 00	Door Hardware
08 71 00.K3	4" Saddle Threshold
08 80 00	Glazing
08 80 00.C0	1/4" Specially Tempered Glass (20 min FR)
08 80 00.S0	Plastic Glazing
08 80 00.S1	Polycarbonate Glazing
09 21 16.N0	5/8" Gypsum Board
09 51 13.K0	24x24 Tegular Acoustical Lay-in Panel
09 65 00.J0	Resilient Base
09 90 00	Painting and Coating
09 90 00.A0	Interior Paint
09 90 00.B0	Exterior Paint
22 42 33	Wash Fountains, Re: Plumbing
22 45 33	Combination Emergency Fixture Units, Re: Plumbing
23 31 13	Metal Ducts, Re: Mech.
26 51 13	Lighting Fixtures and Lamps, Re: Elec.
26 56 00	Exterior Lighting, Re: Elec.
Division 07	Thermal and Moisture Protection
Division 11	Equipment
Division 26	Electrical

REFERENCE NOTES FULL LIST

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AUSTIN, TEXAS 78753
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FAX: 512.474.6761
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PH: 281.384.0611
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NEGRETE & KOLAR
ARCHITECTS,LLP
WWW.NEKOARCH.COM



Project #1809

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DEPT OF PUBLIC WORKS
AUTO WAREHOUSE EXPANSION
McAllen, Texas

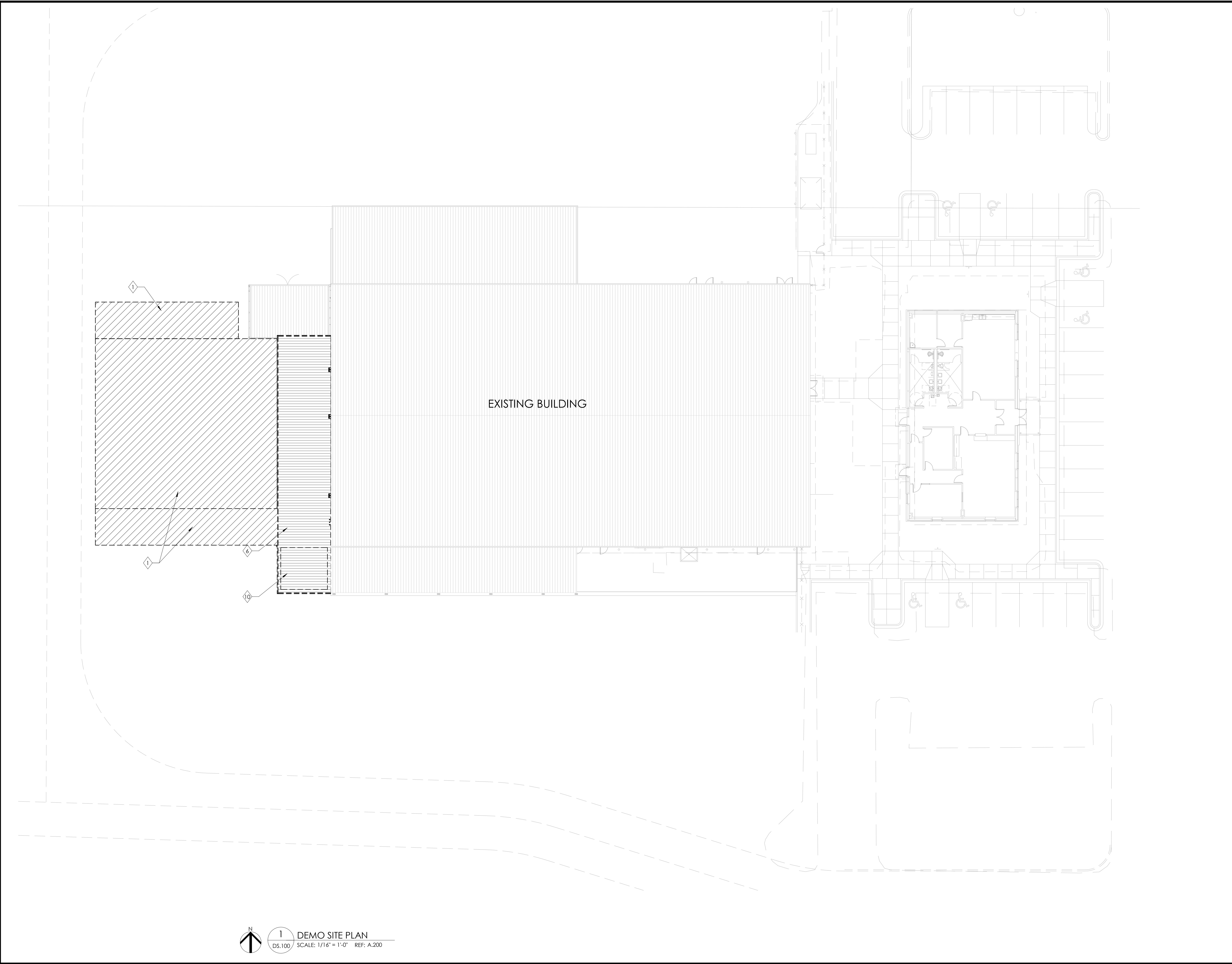
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ISSUED: 06/07/2019
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NO. DATE DESCRIPTION

DRAWING INDEX,
NOTES &
SYMBOLS

G.001



GENERAL NOTES

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LIST OF ALTERNATES

REFER TO PROJECT MANUAL SECTION 01 20 00


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- REFINISH EXISTING CANOPIES/STRUCTURE

11720 NORTH HIRE
AUSTIN, TEXAS 78753
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FAX: 512.474.6761

204 E. STUBBS
STREET
EDINBURG, TX
PH: 956.386.0611
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WWW.NEKOARCH.COM



06/07/2019

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McAllen, Texas

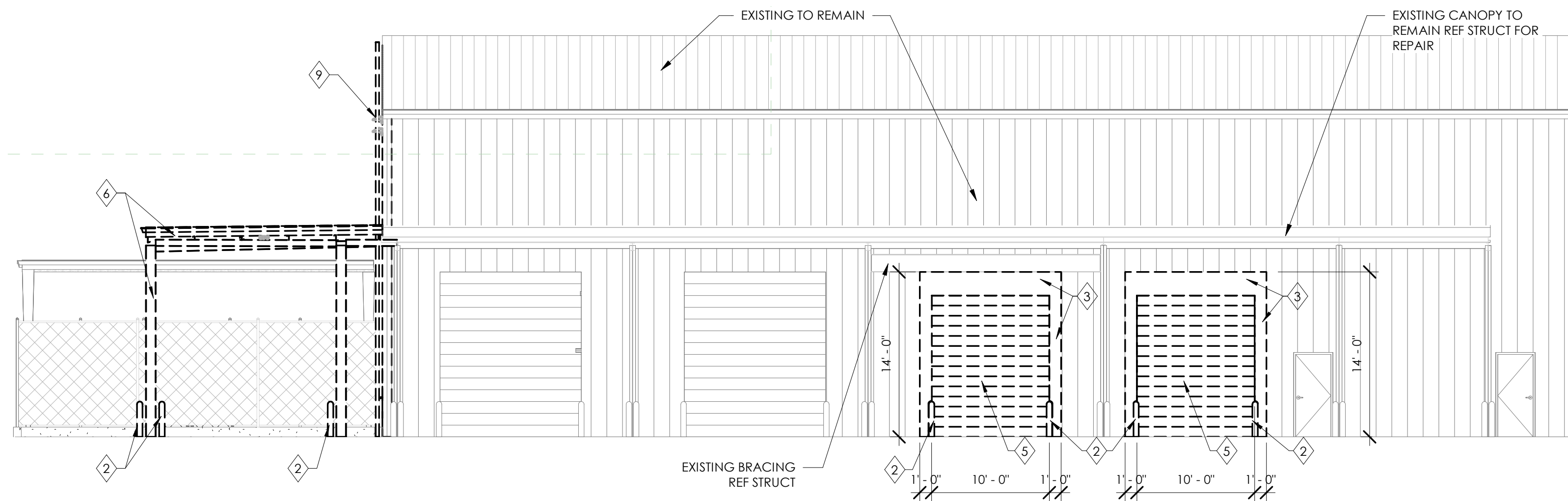
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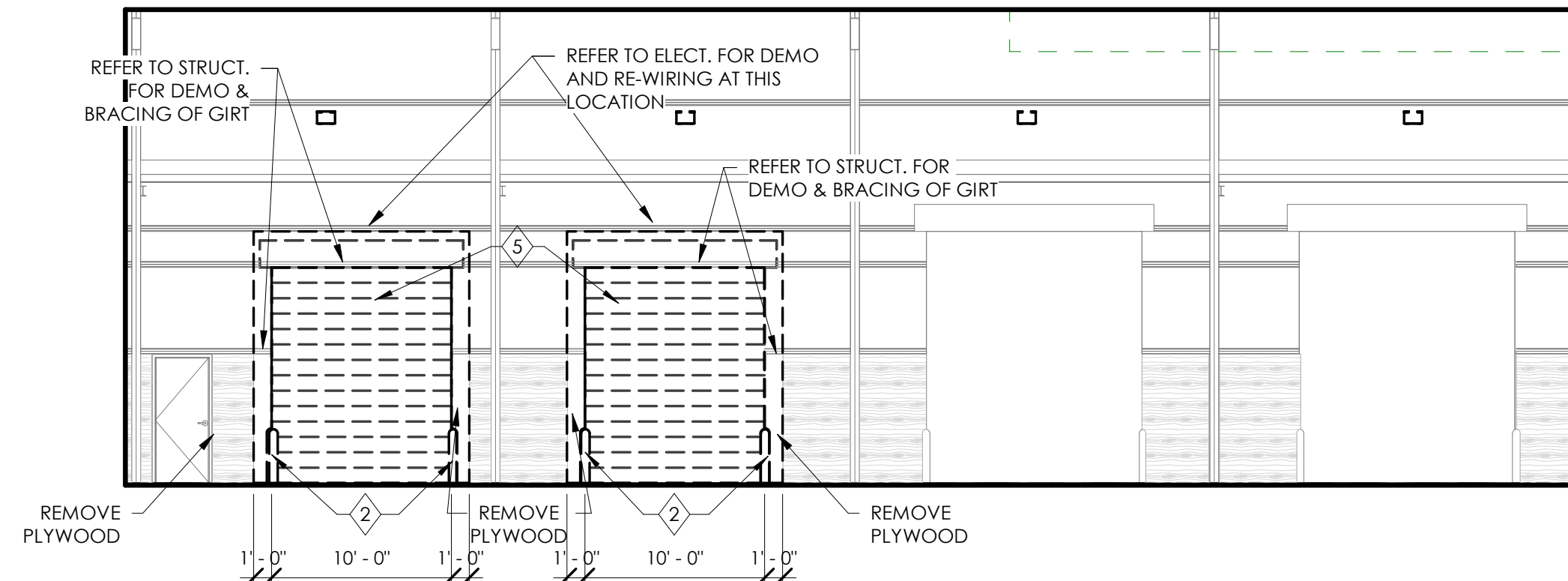
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DEMOLITION SITE PLAN

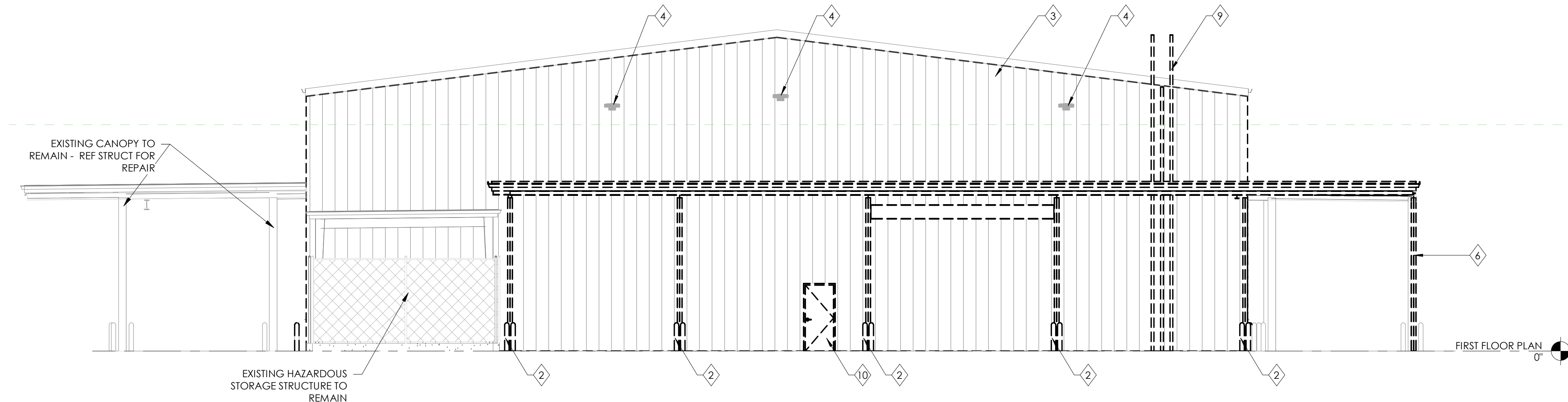
DS.100



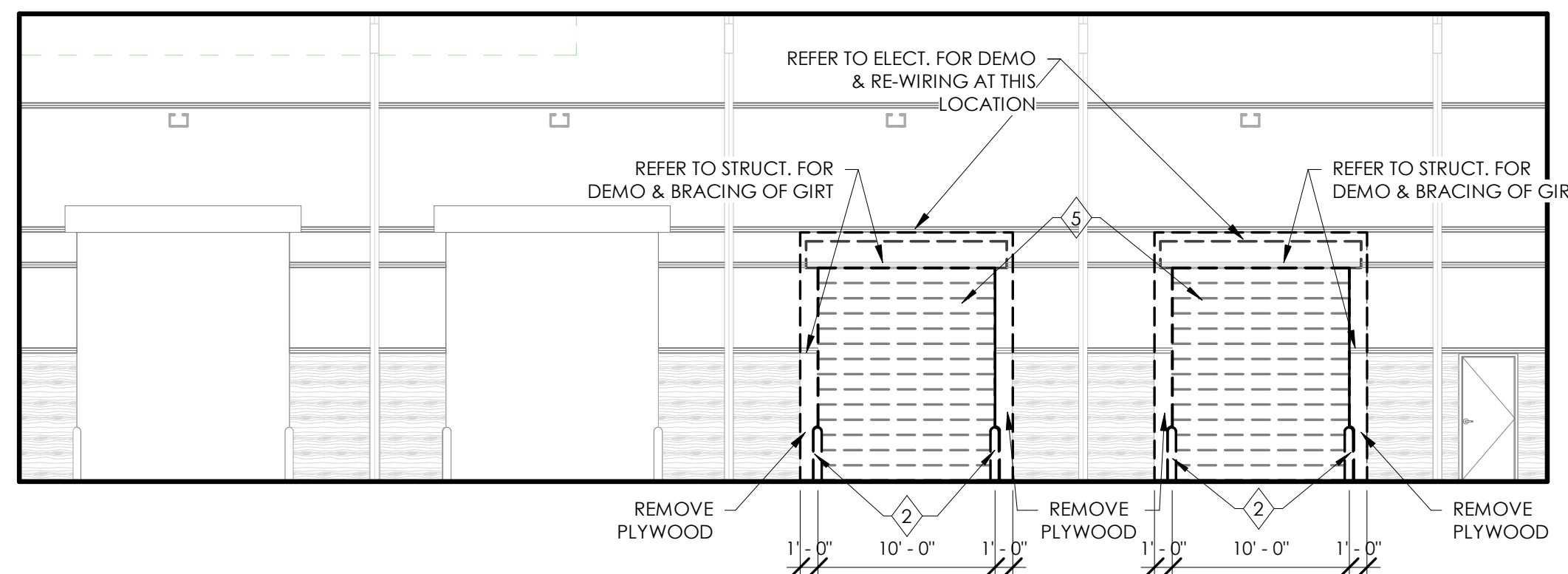
1 DEMO EXTERIOR ELEVATION - SOUTH
D.200 SCALE: 1/8" = 1'-0" REF: D.100



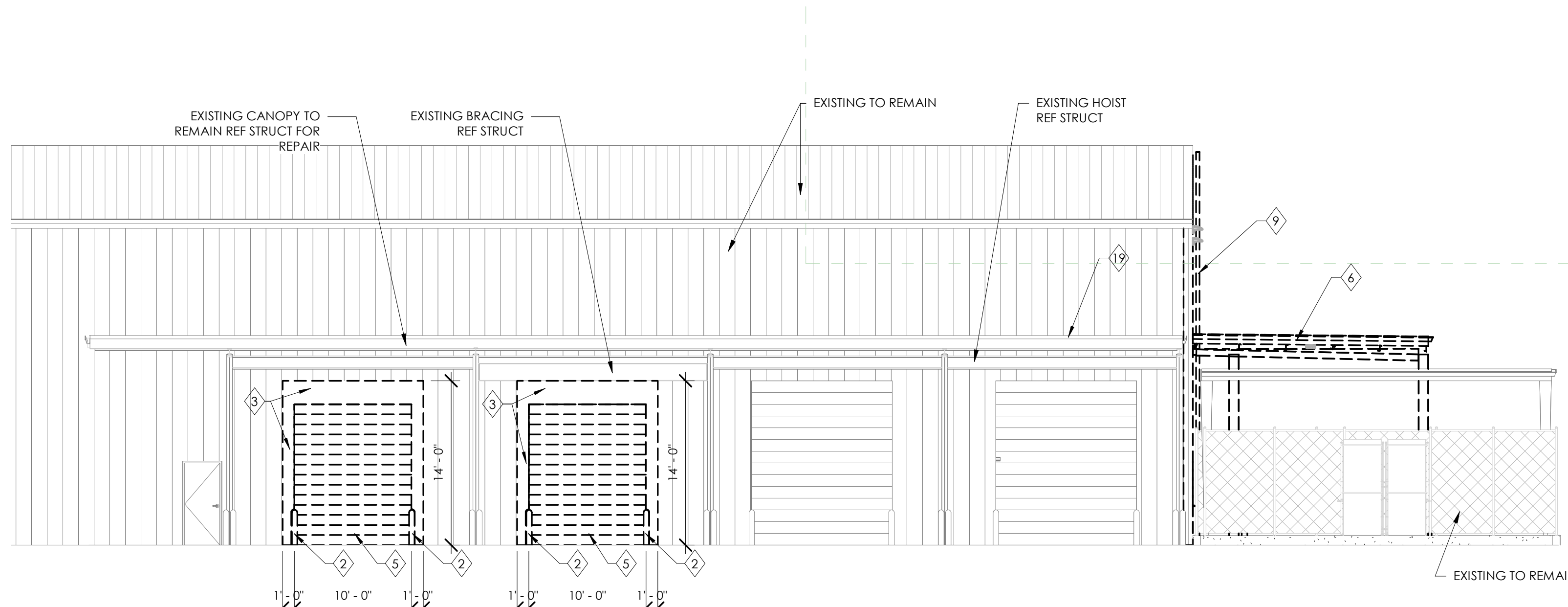
2 DEMO INTERIOR ELEVATION - SOUTH
D.200 SCALE: 1/8" = 1'-0" REF: A.101



3 DEMO EXTERIOR ELEVATION - WEST
D.200 SCALE: 1/8" = 1'-0" REF: A.300



4 DEMO INTERIOR ELEVATION - NORTH
D.200 SCALE: 1/8" = 1'-0" REF: A.101



5 DEMO EXTERIOR ELEVATION - NORTH
D.200 SCALE: 1/8" = 1'-0" REF: D.100

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- 19 REPLACE DAMAGED CANOPY ROOF PANEL

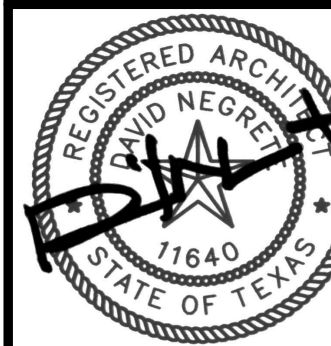
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REFER TO PROJECT MANUAL SECTION 01 20 00

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2. NEW LED LIGHTING AT EXISTING WAREHOUSE
3. REFINISH EXISTING CANOPIES/STRUCTURE

11720 NORTH IH35
AUSTIN, TEXAS 78753
PH: 512.474.6526
FAX: 512.474.6761
204 E. STUBBS
STREET
EDINBURG, TX
PH: 281.384.0611
FAX: 281.384.0613

NEGRETE & KOLAR
ARCHITECTS^{LLP}



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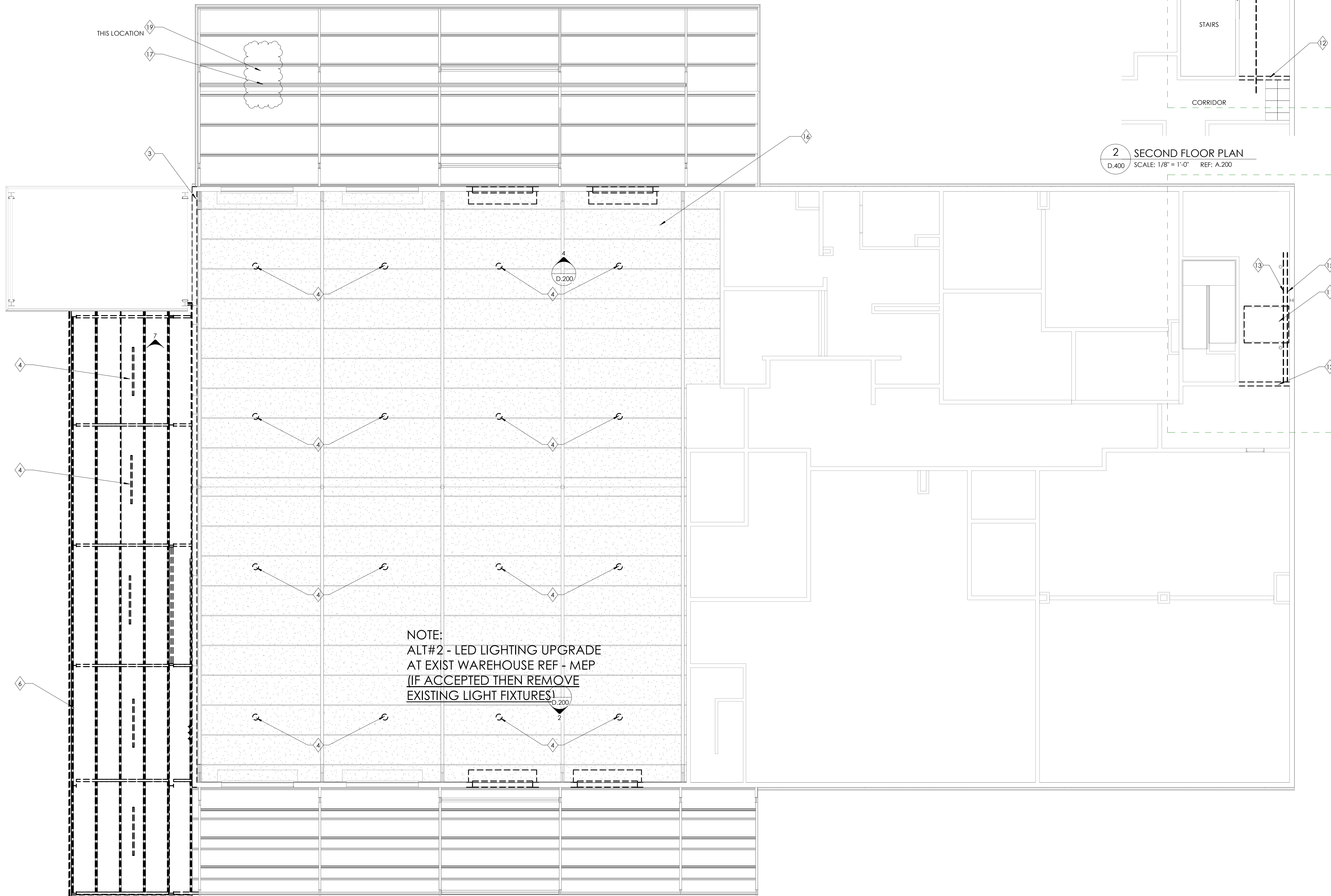
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DEMOLITION
EXTERIOR
ELEVATIONS

D.200



NOTE: ALT #1 - ELEVATOR

2 SECOND FLOOR PLAN
D.400 SCALE: 1/8" = 1'-0" REF: A.200

1 DEMO REFLECTED CEILING PLAN
D.400 SCALE: 1/8" = 1'-0" REF: A.200

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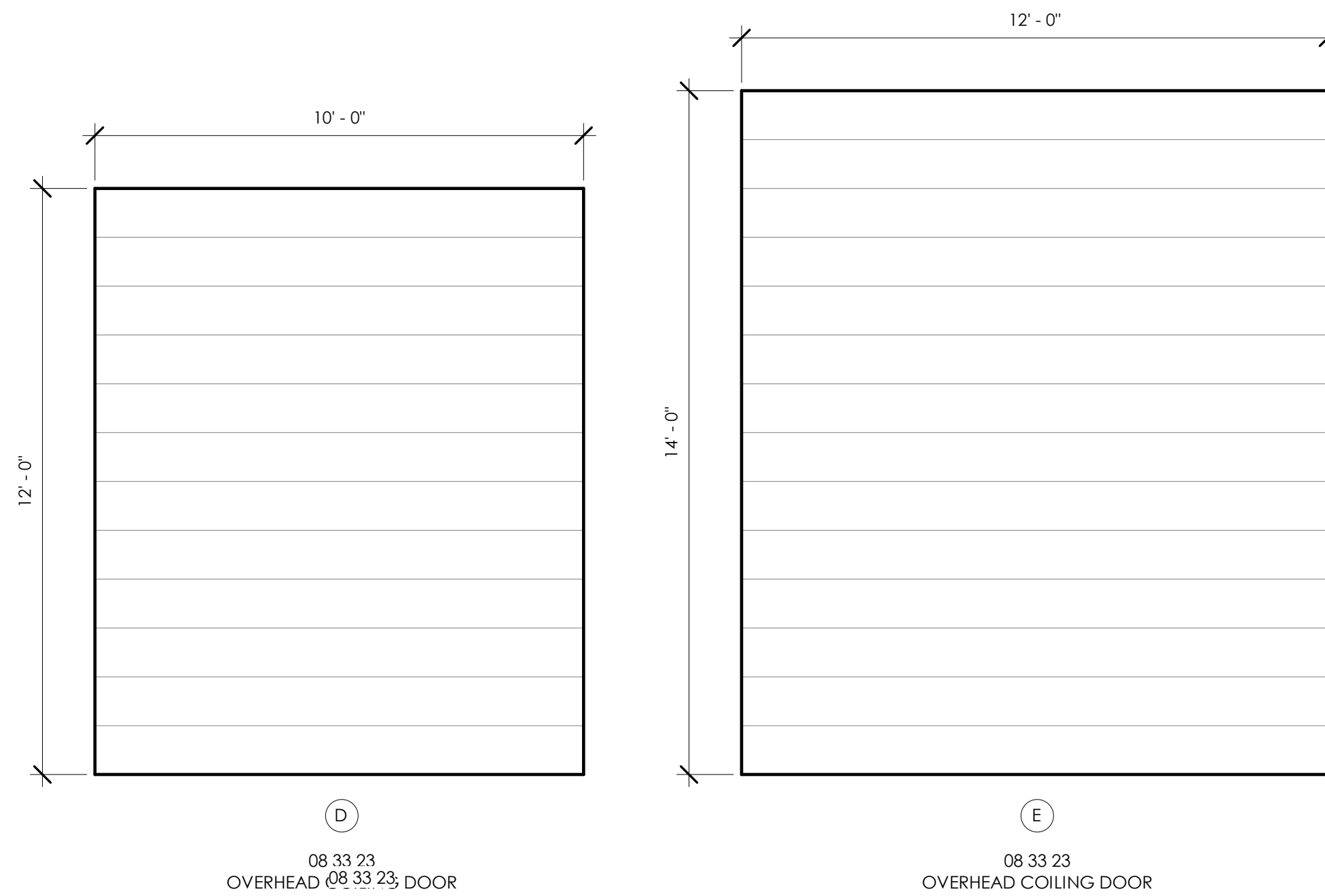
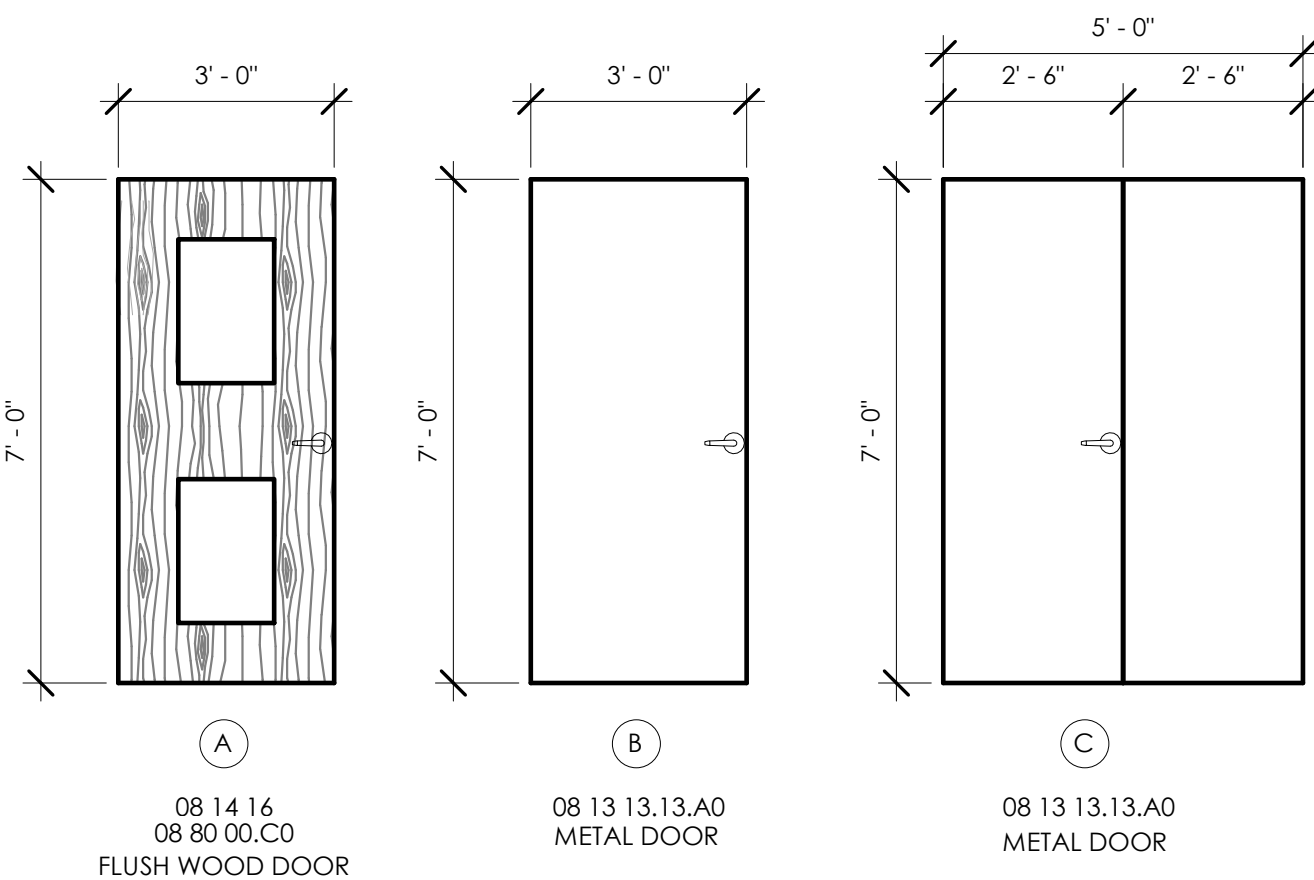
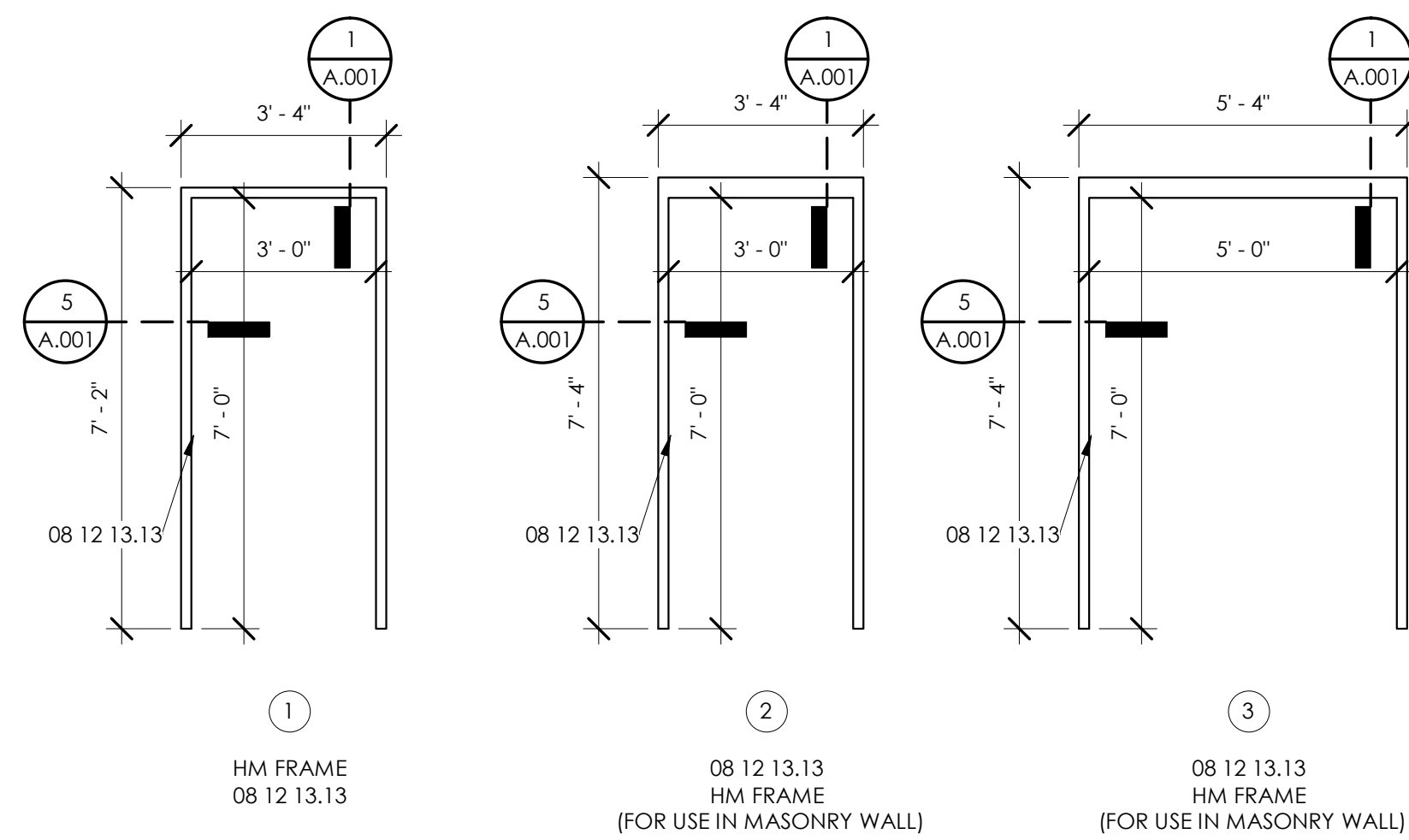
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NO. DATE DESCRIPTION
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DEMO
REFLECTED
CEILING PLAN

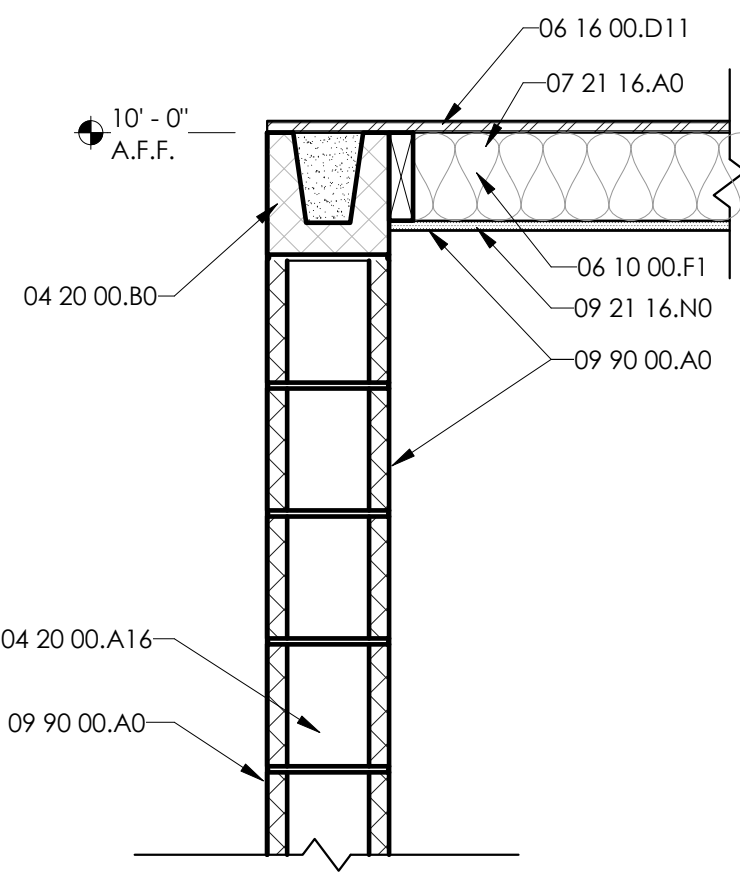
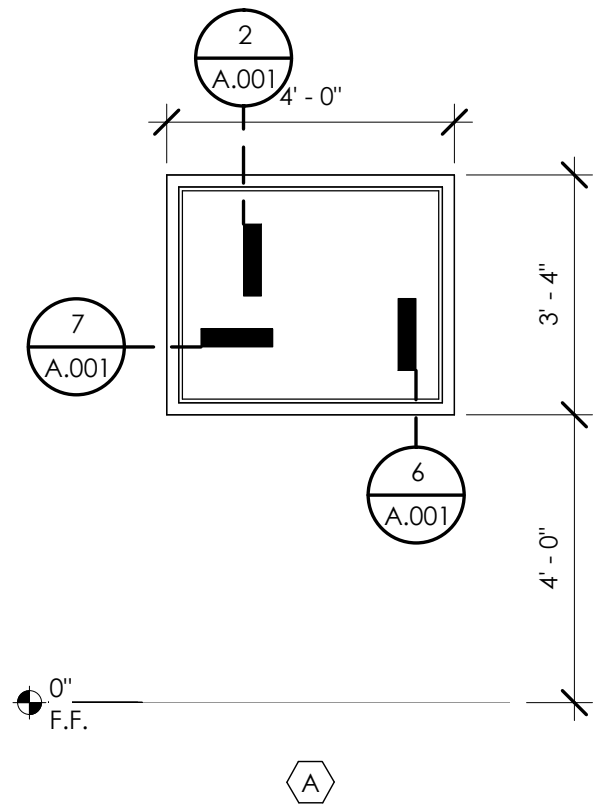
D.400

ROOM SCHEDULE										
ROOM NUMBER	ROOM NAME	FLOOR		WALL FINISH				CEILING		NOTES
		MATERIAL	BASE	NORTH	EAST	SOUTH	WEST	MATERIAL	HEIGHT	
100	OFFICE	SC	RB		P-CMU	P-CMU	P-CMU	P-GB		
101	AUTO WAREHOUSE	SC						XST		
102	FOYER	VCT	RB					SAT		
103	ELEVATOR									
104	CLOSET									
201	ELEVATOR									
203	FOYER	VCT	RB					SAT		
Grand total: 7										

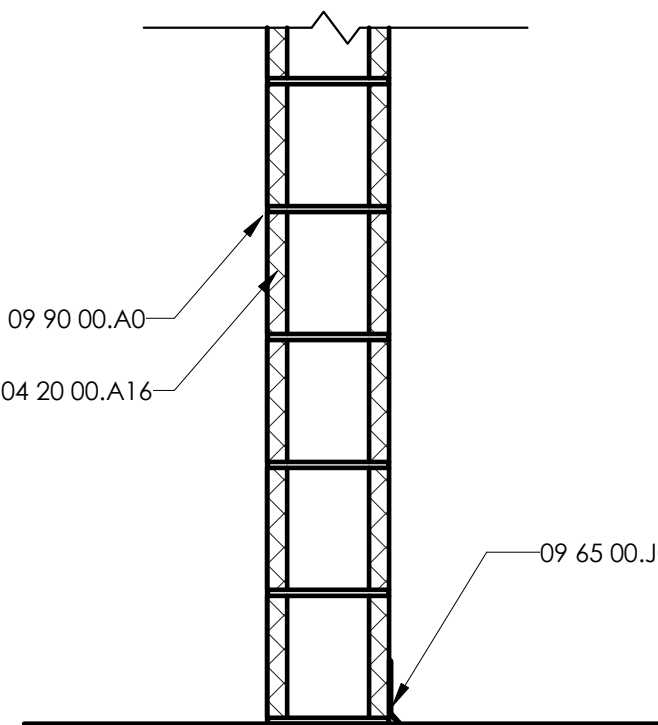
FINISH LEGEND		
DESIGNATION	Materials	Reference Notes
FLOORING:		
SC	SEALED CONCRETE	03 35 00
WALL BASE:		
RB	RUBBER BASE	09 65 00
WALLS:		
P-CMU	PAINTED CMU	04 20 00.B , 09 90 00
P-GB	PAINTED GYPSUM BOARD	09 21 16, 09 90 00
CEILINGS:		
P-GB	PAINTED GYPSUM BOARD	09 21 16, 09 90 00
SAT	SUSPENDED ACOUSTICAL TILE	09 51 00
XST	EXPOSED STRUCTURE	05 12 00, 05 31 00, 09 90 00
NOTES:		



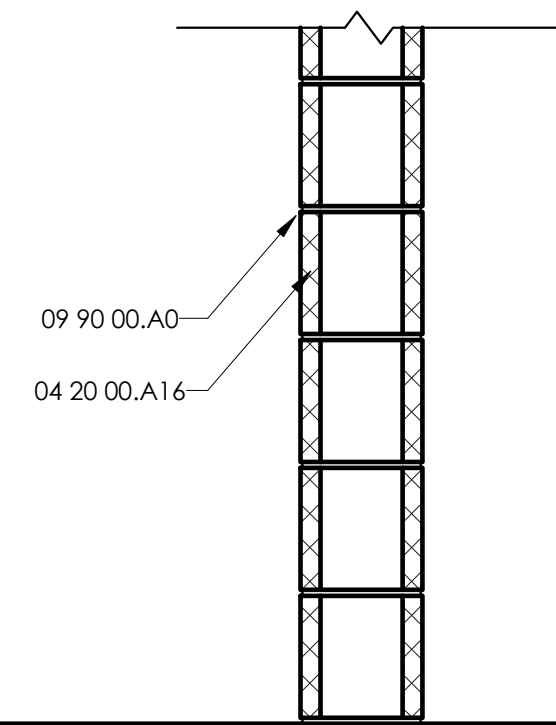
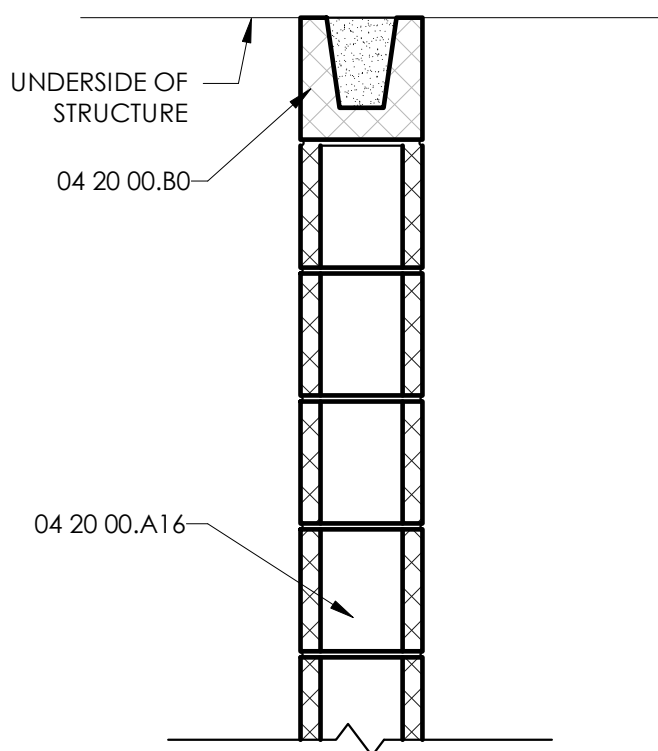
1 FRAME TYPES
SCALE: 3/8" = 1'-0" REF:



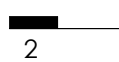
3 WINDOW TYPES
SCALE: 3/8" = 1'-0" REF:



2 DOOR TYPES
SCALE: 3/8" = 1'-0" REF:



4 PARTITION TYPE
SCALE: 1"=1'-0" REF:



DOOR & FRAME SCHEDULE																
Door No.	Doors					Frames								Fire Rating	Hardware Set No.	Remarks
	Type	Material	View Panel	Glazing	Int / Exterior	Frame Type	Frame Matl.	Head Height	Jamb	Hinge Jamb	HEAD	Threshold				
100	A	08 14 16	FULL	08 80 00.CO	INT	HM-2	08 12 13.13	7'-0"	5/A.001	5/A.001	1/A.001	A-4/A.001				
101A	D	08 33 23	-----	-----	EXT	-----	08 33 23	12'-0"			8/A.520					
101B	D	08 33 23	-----	-----	EXT	-----	08 33 23	12'-0"			8/A.520					
101C	D	08 33 23	-----	-----	EXT	-----	08 33 23	12'-0"			8/A.520					
101D	D	08 33 23	-----	-----	EXT	-----	08 33 23	12'-0"			8/A.520					
101E	D	08 33 23	-----	-----	EXT	-----	08 33 23	12'-0"			8/A.520					
101F	D	08 33 23	-----	-----	EXT	-----	08 33 23	12'-0"			8/A.520					
101G	D	08 33 23	-----	-----	EXT	-----	08 33 23	12'-0"			8/A.520					
101H	D	08 33 23	-----	-----	EXT	-----	08 33 23	12'-0"			8/A.520					
101I	B	08 13 13.13.A0	-----	-----	EXT	HM-1	08 12 13.13	7'-0"	8/A.001	8/A.001	3/A.001	B-4/A.001				
101J	E	08 33 23	-----	-----	EXT	-----	08 33 23	14'-0"								
101K	E	08 33 23	-----	-----	EXT	-----	08 33 23	14'-0"								
101L	E	08 33 23	-----	-----	EXT	-----	08 33 23	14'-0"								
101M	E	08 33 23	-----	-----	EXT	-----	08 33 23	14'-0"								
104	B	08 13 13.13.A0	-----	-----	INT	HM-2	08 12 13.13	7'-0"	5/A.001	5/A.001	1/A.001	A-4/A.001				

GENERAL NOTES

1. REFER TO SHEET G.001 FOR FULL LIST OF REFERENCE NOTES
2. REFER TO STRUCTURAL FOR ADDITIONAL CONCRETE SLAB/FOUNDATION INFORMATION.
3. REFER TO ELECTRICAL FOR ADDITIONAL INFORMATION.
4. REFER TO PLUMBING FOR ADDITIONAL FLOOR DRAIN INFORMATION.

REFERENCE NOTES

- 04 20 00.A16 8" x 8" x 16" CMU
04 20 00.B0 CMU Bond Beam
06 10 00.F1 2x6 Framing
06 16 00.D11 3/4" Plywood
07 21 16.A0 Sound Batt Insulation
08 12 13.13 Standard Hollow Metal Frames
08 13 13.A0 Standard Hollow Metal Door
08 14 16 Flush Wood Doors
08 33 23 Overhead Coiling Doors
08 80 00.CO 1/4" Specially Tempered Glass (20 min FR)
09 21 16.N0 5/8" Gypsum Board
09 65 00.J0 Resilient Base
09 90 00.A0 Interior Paint

11700 NORTH IH35
AUSTIN, TEXAS 78753
PH: 512.474.6526
FAX: 512.474.6761
204 E. STUBBS
STREET
EDINBURG, TX
77629
PH: 281.386.0411
FAX: 281.386.0613

NEGRETE & KOLAR
ARCHITECTS LLP



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AUTO WAREHOUSE EXPANSION
McAllen, Texas

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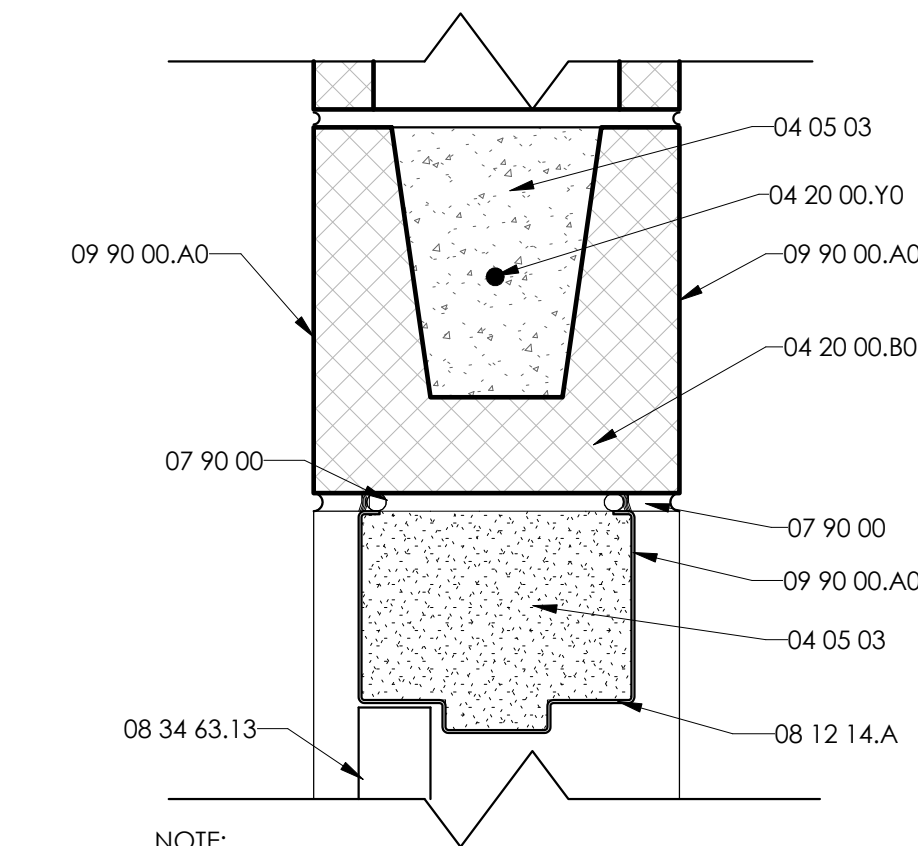
NOTE:
PAINT ALL EXPOSED STEEL SURFACES

LIST OF ALTERNATES

- REFER TO PROJECT MANUAL SECTION 01 20 00
1. ADD NEW ELEVATOR
 2. NEW LED LIGHTING AT EXISTING WAREHOUSE
 3. REFINISH EXISTING CANOPIES/STRUCTURE

DOOR, FRAME
TYPES &
SCHEDULES

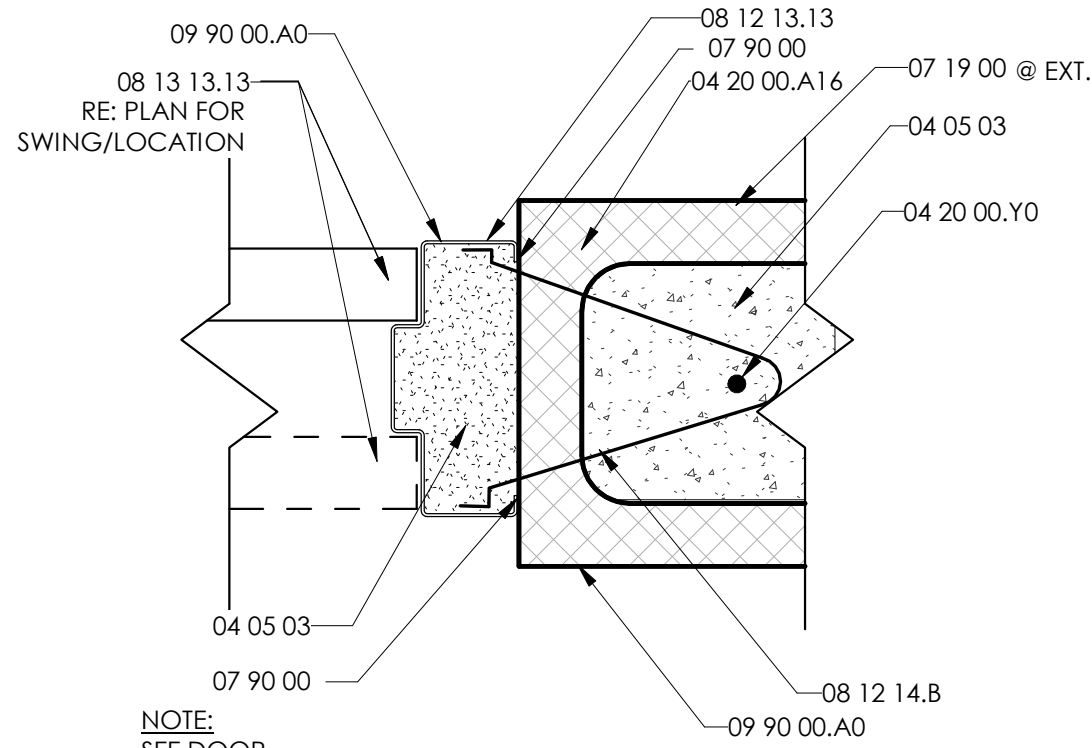
A.000



NOTE:
SEE DOOR
SCHEDULE FOR
DOOR TYPE.

HOLLOW METAL DOOR
FRAME HEAD SECTION 8"
MASONRY UNIT DETAIL

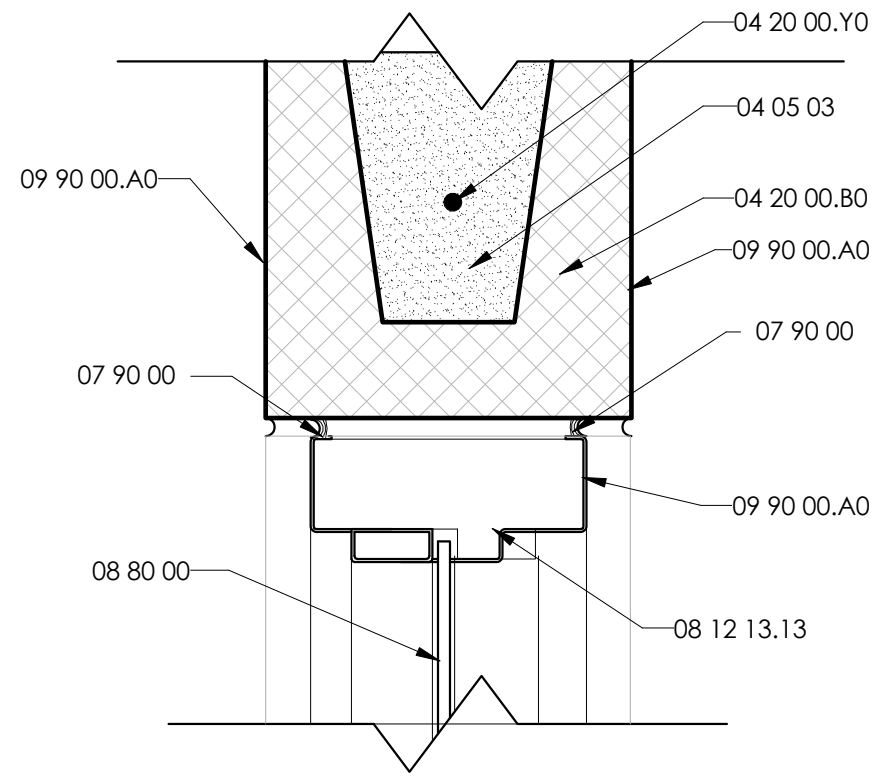
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A.001 SCALE: 3" = 1'-0" REF: A.000



NOTE:
SEE DOOR
SCHEDULE FOR
DOOR TYPE.

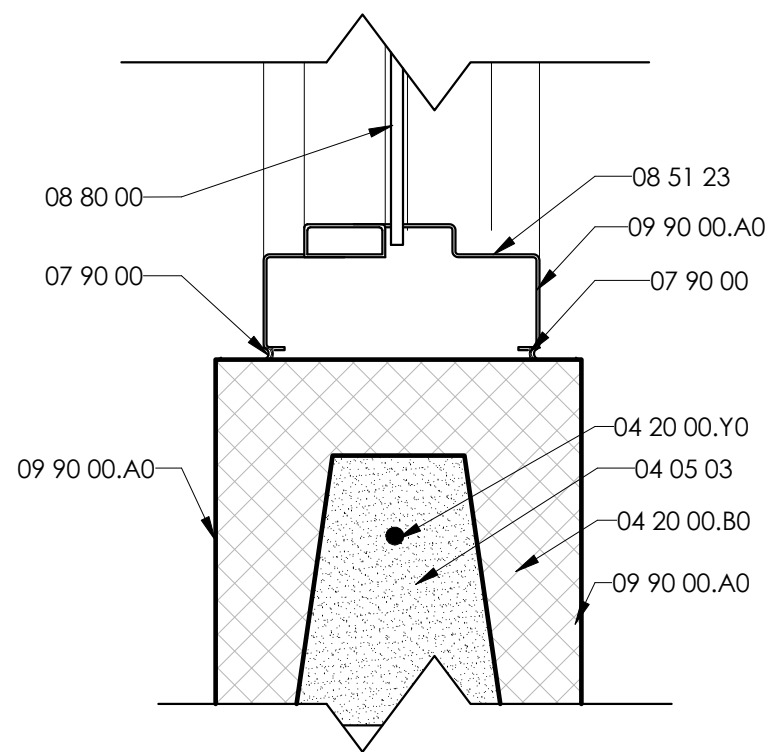
HOLLOW METAL DOOR
FRAME JAMB SECTION 8"
CONCRETE MASONRY
UNIT DETAIL

5
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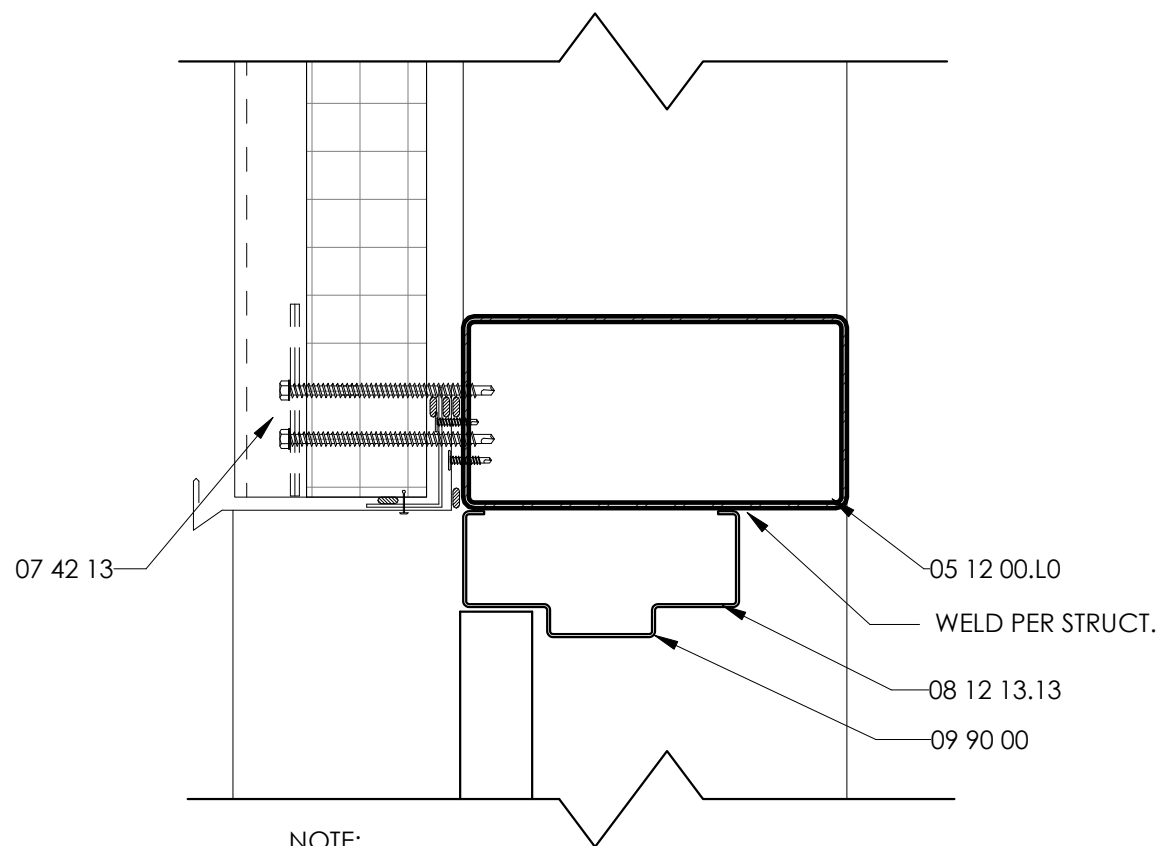
HOLLOW METAL
WINDOW FRAME HEAD
SECTION CMU DETAIL

2
A.001 SCALE: 3" = 1'-0" REF: A.000



HOLLOW METAL
WINDOW FRAME SILL
SECTION CMU DETAIL

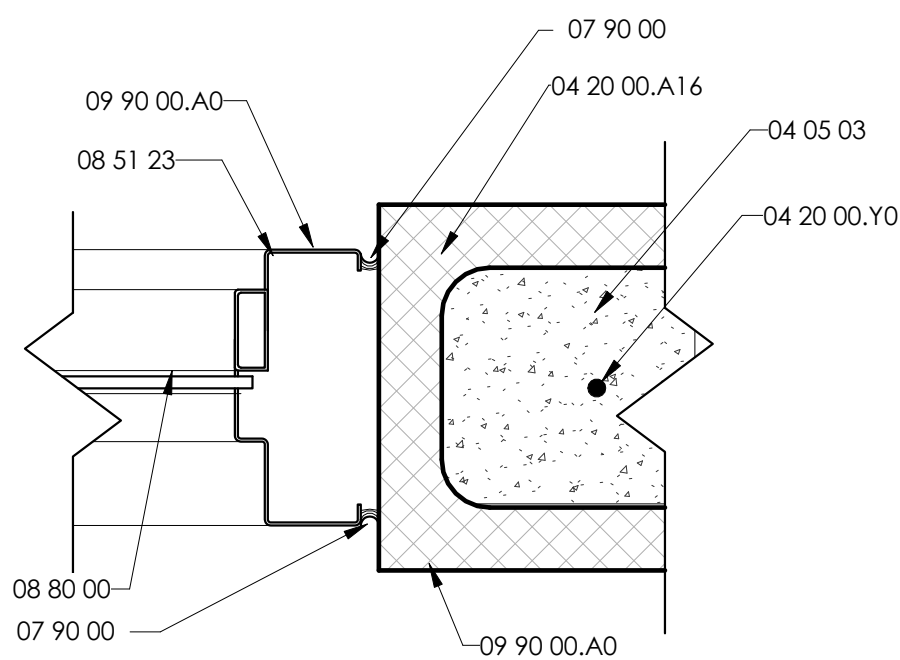
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NOTE:
SEE DOOR
SCHEDULE FOR
DOOR TYPE.

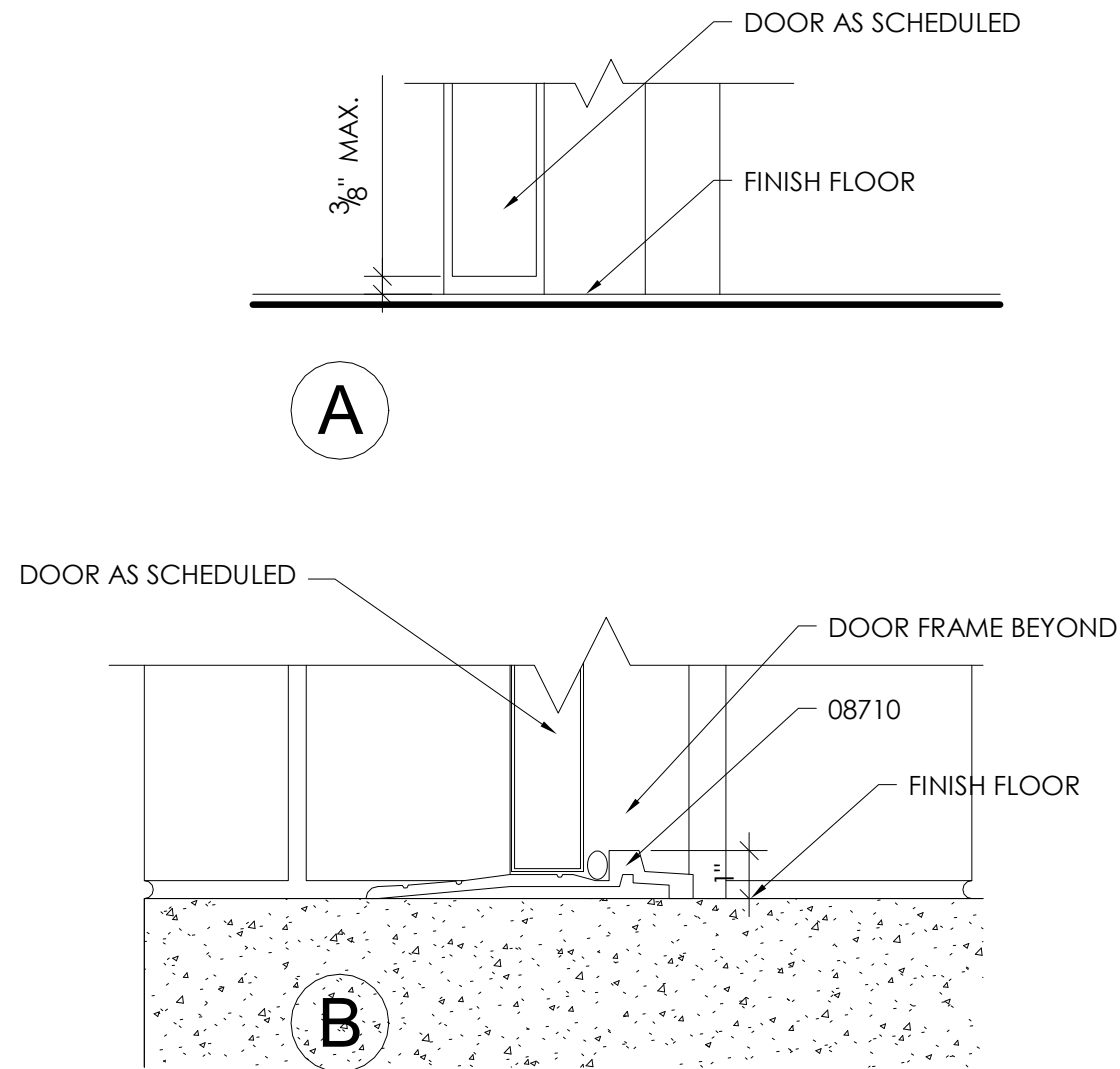
HOLLOW METAL DOOR
FRAME HEAD SECTION
METAL FRAME

3
A.001 SCALE: 3" = 1'-0" REF: A.510



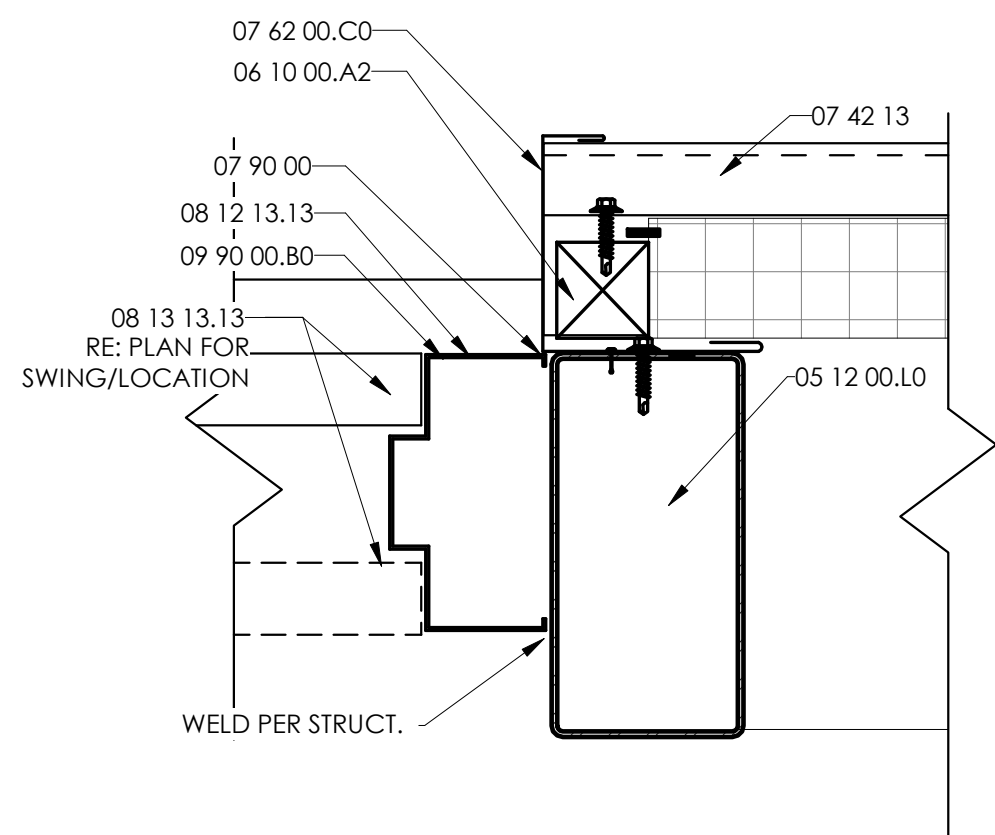
HOLLOW METAL
WINDOW FRAME JAMB
SECTION CMU DETAIL

7
A.001 SCALE: 3" = 1'-0" REF: A.000



4 THRESHOLD DETAILS

A.001 SCALE: 3" = 1'-0" REF:



NOTE:
SEE DOOR
SCHEDULE FOR
DOOR TYPE.

HOLLOW METAL DOOR
FRAME JAMB SECTION
METAL FRAME

8
A.001 SCALE: 3" = 1'-0" REF:

GENERAL NOTES

1. REFER TO SHEET G.001 FOR FULL LIST OF REFERENCE NOTES
2. REFER TO STRUCTURAL FOR ADDITIONAL CONCRETE SLAB/FOUNDATION INFORMATION.
3. REFER TO ELECTRICAL FOR ADDITIONAL INFORMATION.
4. REFER TO PLUMBING FOR ADDITIONAL FLOOR DRAIN INFORMATION.

REFERENCE NOTES

- 04 05 03 Masonry Mortaring and Grouting
- 04 20 00.A16 8" x 8" x 16" CMU
- 04 20 00.B0 CMU Bond Beam
- 04 20 00.Y0 Reinforcing Steel, Re: Struct.
- 05 12 00.L0 Hollow Steel Section, Re: Struct.
- 06 10 00.A2 Wood Blocking As Required
- 07 19 00 Water Repellants
- 07 42 13 Metal Wall Panels
- 07 62 00.C0 Metal Formed Trim
- 07 90 00 Joint Protection
- 08 12 13.13 Standard Hollow Metal Frames
- 08 12 14.A
- 08 12 14.B
- 08 13 13.13 Standard Hollow Metal Doors
- 08 34 63.13
- 08 51 23 Steel Windows
- 08 80 00 Glazing
- 09 90 00 Painting and Coating
- 09 90 00.A0 Interior Paint
- 09 90 00.B0 Exterior Paint

NOTE:
PAINT ALL EXPOSED STEEL SURFACES

LIST OF ALTERNATES

- REFER TO PROJECT MANUAL SECTION 01 20 00
1. ADD NEW ELEVATOR
 2. NEW LED LIGHTING AT EXISTING WAREHOUSE
 3. REFINISH EXISTING CANOPIES/STRUCTURE

11700 NORTH IH35
AUSTIN, TEXAS 78753
PH: 512.474.6526
FAX: 512.474.6761
204 E. STUBBS
STREET
EDINBURG, TX
PH: 281.386.0611
FAX: 281.386.0613

NEGRETTE & KOLAR
ARCHITECTS^{LLP}
WWW.NEKOARCH.COM



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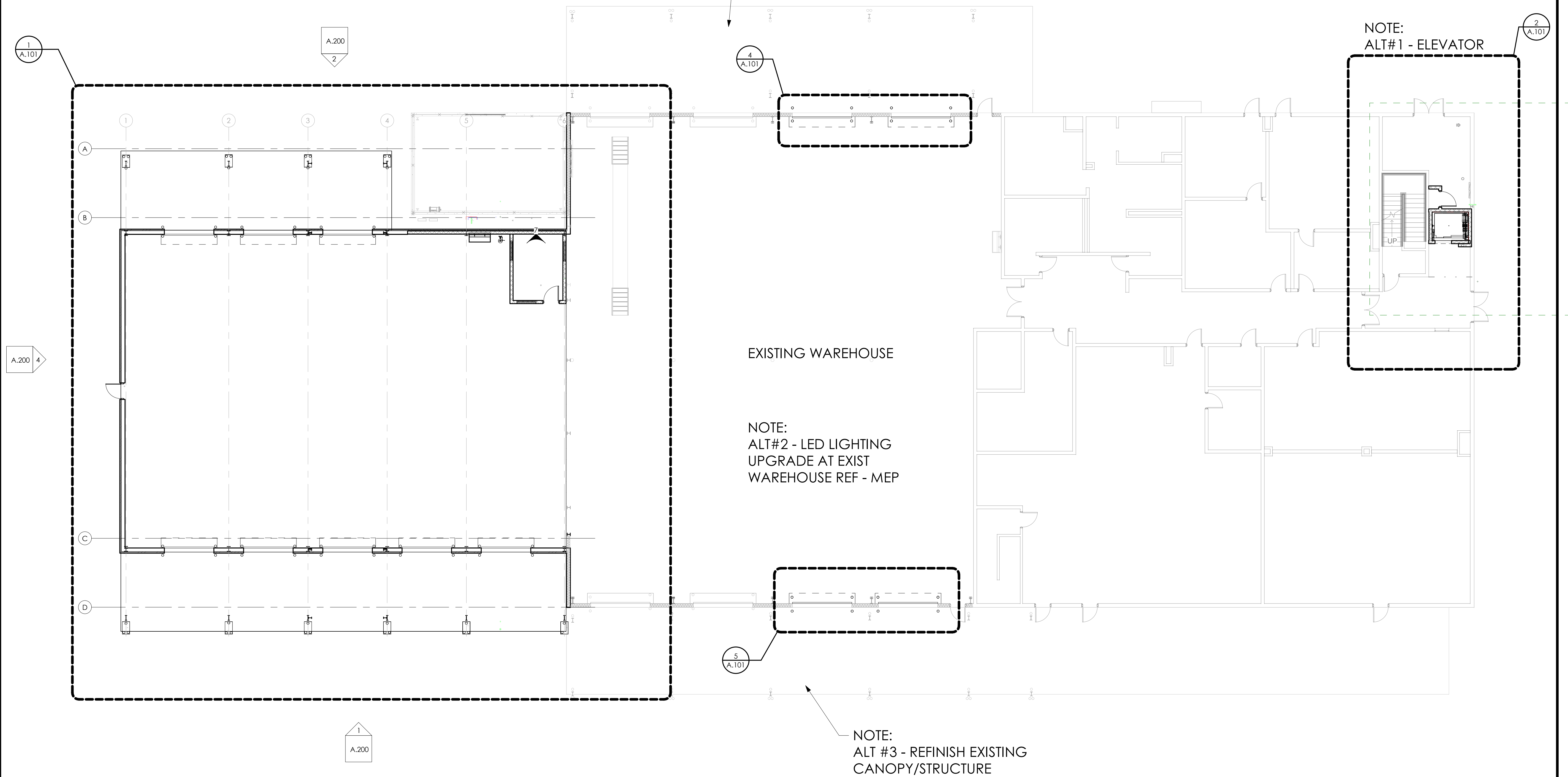
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DOOR &
WINDOW
DETAILS

A.001



GENERAL NOTES

1. REFER TO SHEET G.001 FOR FULL LIST OF REFERENCE NOTES
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REFERENCE NOTES

LIST OF ALTERNATES

REFER TO PROJECT MANUAL SECTION 01 20 00

1. ADD NEW ELEVATOR
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11720 NORTH IH35
AUSTIN TEXAS 78753
PH. 512.474.6526
FAX. 512.474.6761

204 E. STUBBS
STREET
EDINBURG, TX
78539
PH. 956.386.0611
FAX. 956.386.0613

NEGRETTE & KOLAR
ARCHITECTS^{LLP}
WWW.NEOARCH.COM



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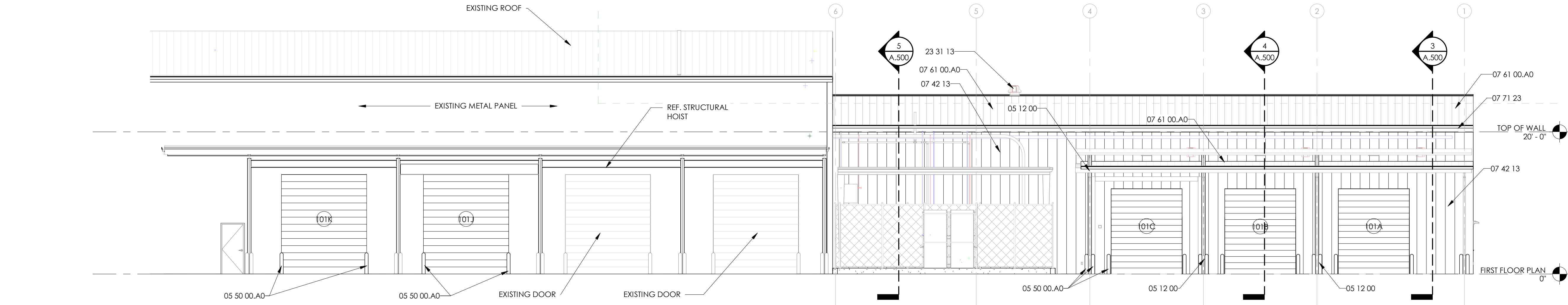
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NO.	DATE	DESCRIPTION
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OVERALL FLOOR PLAN

A.100





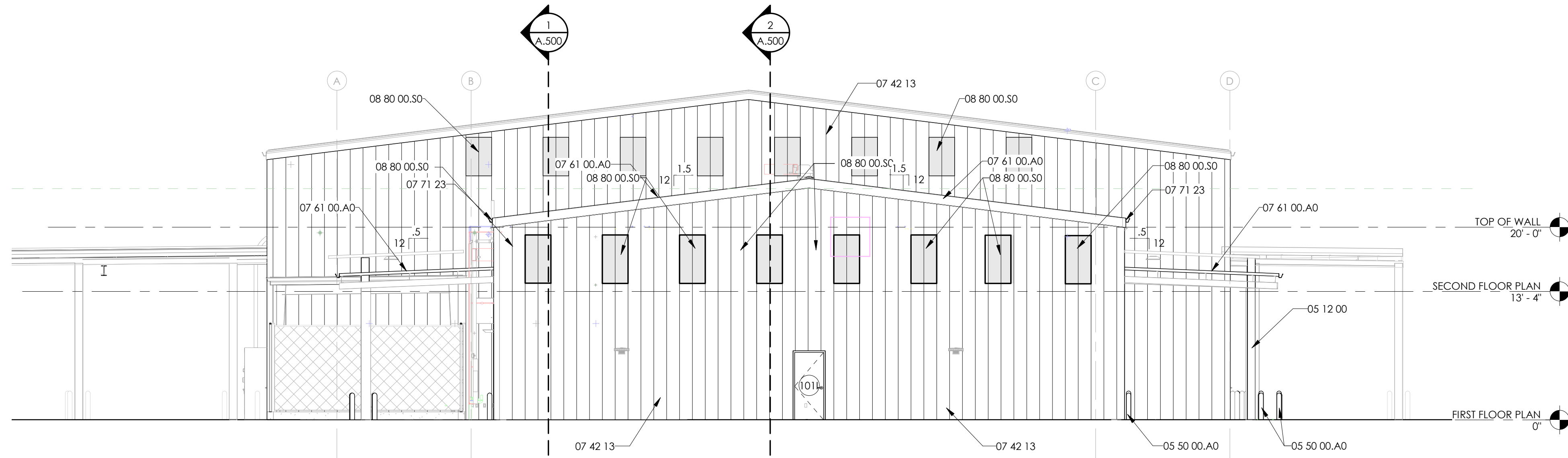
NOTE: ALT #3

2
A.200

EXTERIOR ELEVATION - NORTH

SCALE: 1/8" = 1'-0" REF: A.100

NOTE: PAINT ALL EXPOSED STEEL SURFACES (CANOPY, BOLLARDS, ETC.)



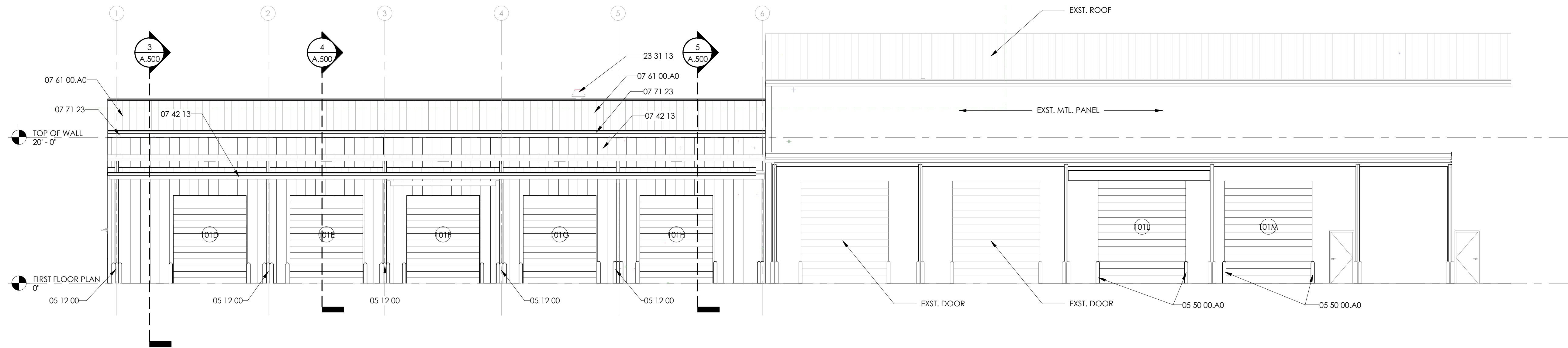
NOTE: ALT #3

4
A.200

EXTERIOR ELEVATION - WEST

SCALE: 1/8" = 1'-0" REF: A.100

NOTE: PAINT ALL EXPOSED STEEL SURFACES



1
A.200

EXTERIOR ELEVATION - SOUTH

SCALE: 1/8" = 1'-0" REF: A.100

NOTE: PAINT ALL EXPOSED STEEL SURFACES

NOTE: ALT #3

GENERAL NOTES

1. REFER TO SHEET G.001 FOR FULL LIST OF REFERENCE NOTES
2. REFER TO STRUCTURAL FOR ADDITIONAL CONCRETE SLAB/FOUNDATION INFORMATION.
3. REFER TO ELECTRICAL FOR ADDITIONAL INFORMATION.
4. REFER TO PLUMBING FOR ADDITIONAL FLOOR DRAIN INFORMATION.

REFERENCE NOTES

- 05 12 00 Structural Steel, Re:Struct.
- 05 50 00.A0 Pipe Bollard
- 07 42 13 Metal Wall Panels
- 07 61 00.A0 Standing Seam Seamed Roofing Panel
- 07 71 23 Gutters and Downspouts
- 08 80 00.S0 Plastic Glazing
- 08 80 00.S1 Polycarbonate Glazing
- 23 31 13 Metal Ducts, Re: Mech.

11700 NORTH HIRE
AUSTIN, TEXAS 78753
PH: 512.474.6526
FAX: 512.474.6761

204 E. STUBBS
STREET
EDINBURG, TX
PH: 956.386.0611
FAX: 956.386.0613

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ARCHITECTS LLP

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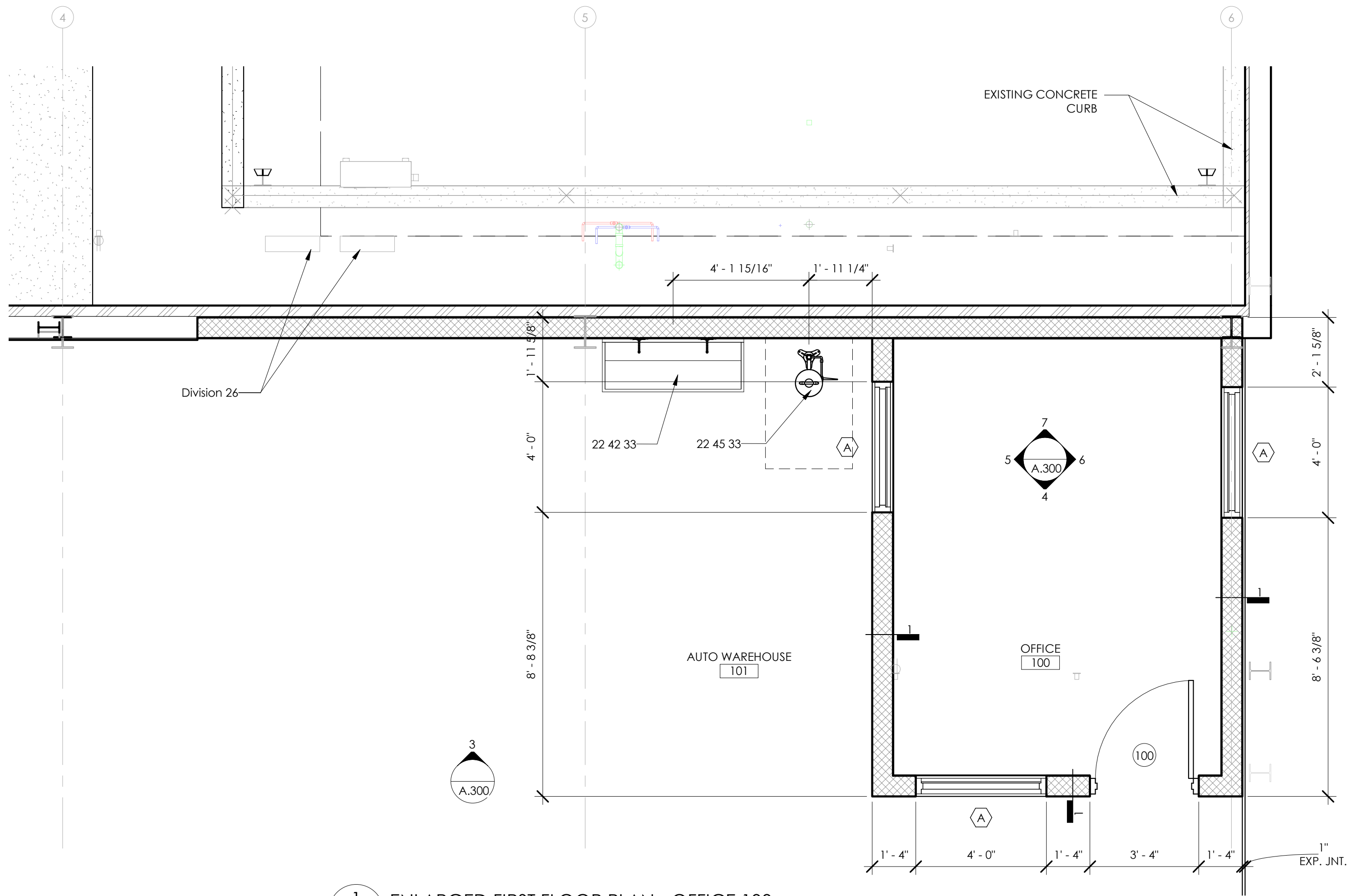
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LIST OF ALTERNATES

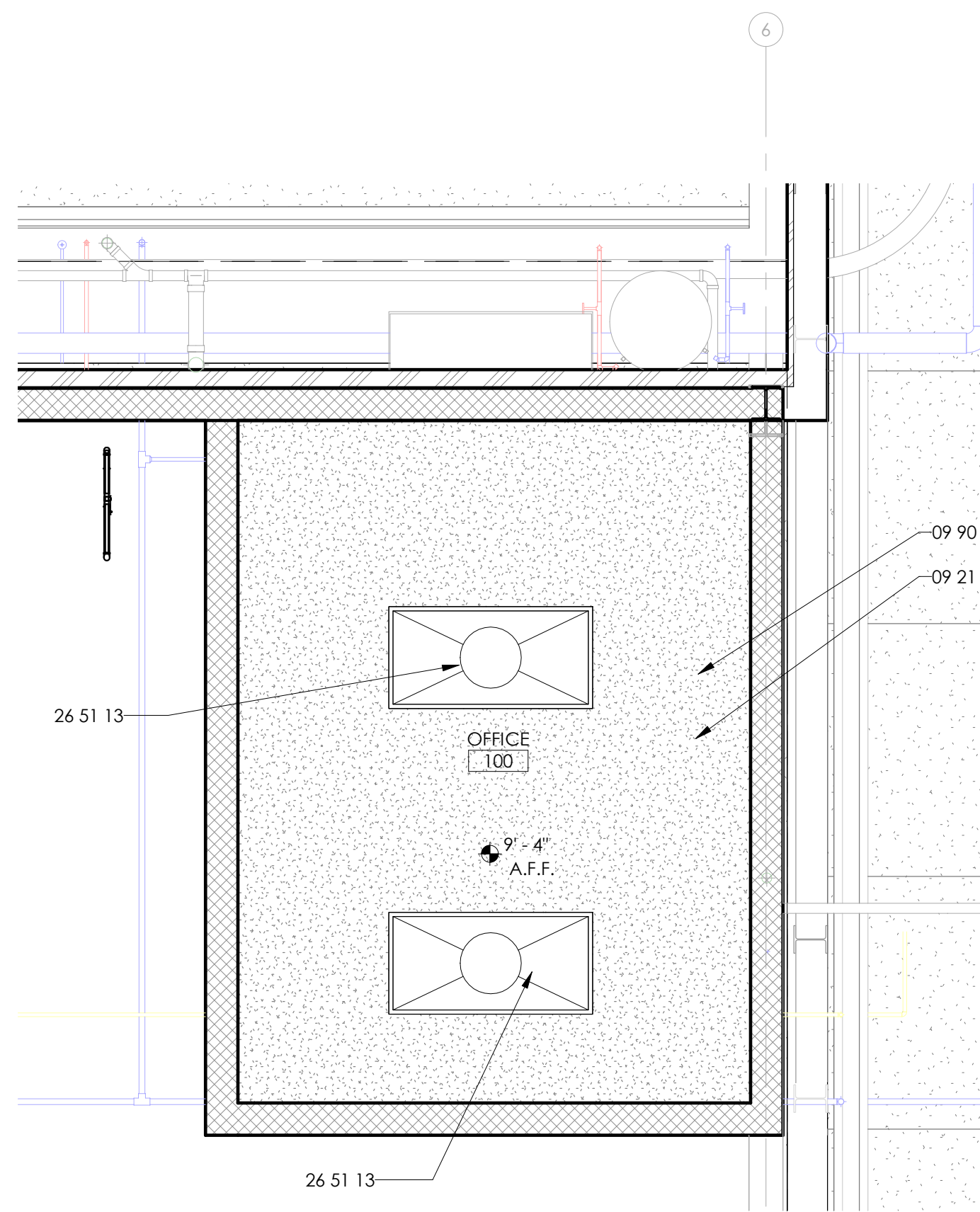
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1. ADD NEW ELEVATOR
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 3. REFINISH EXISTING CANOPIES/STRUCTURE

EXTERIOR
ELEVATIONS

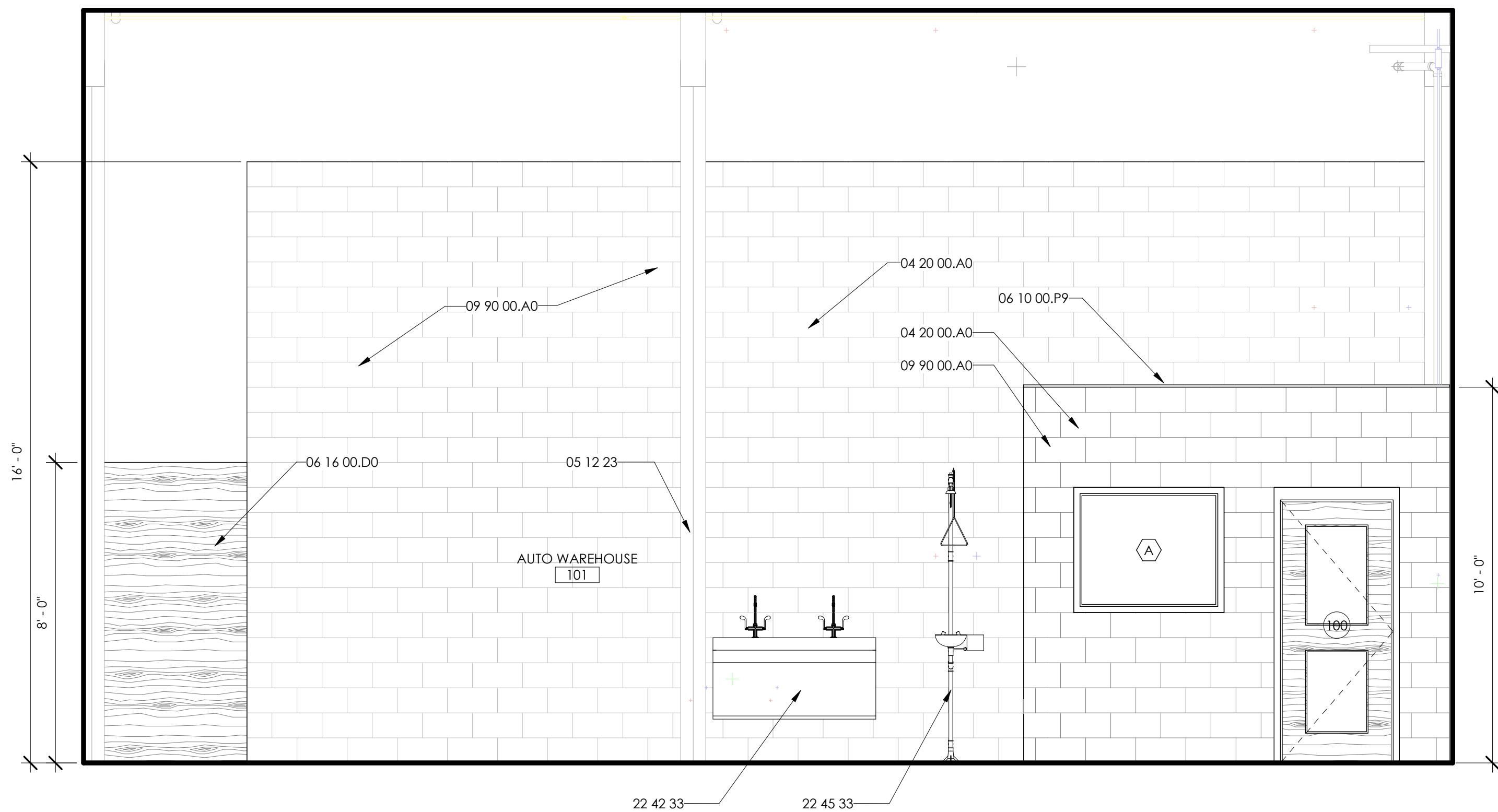
A.200



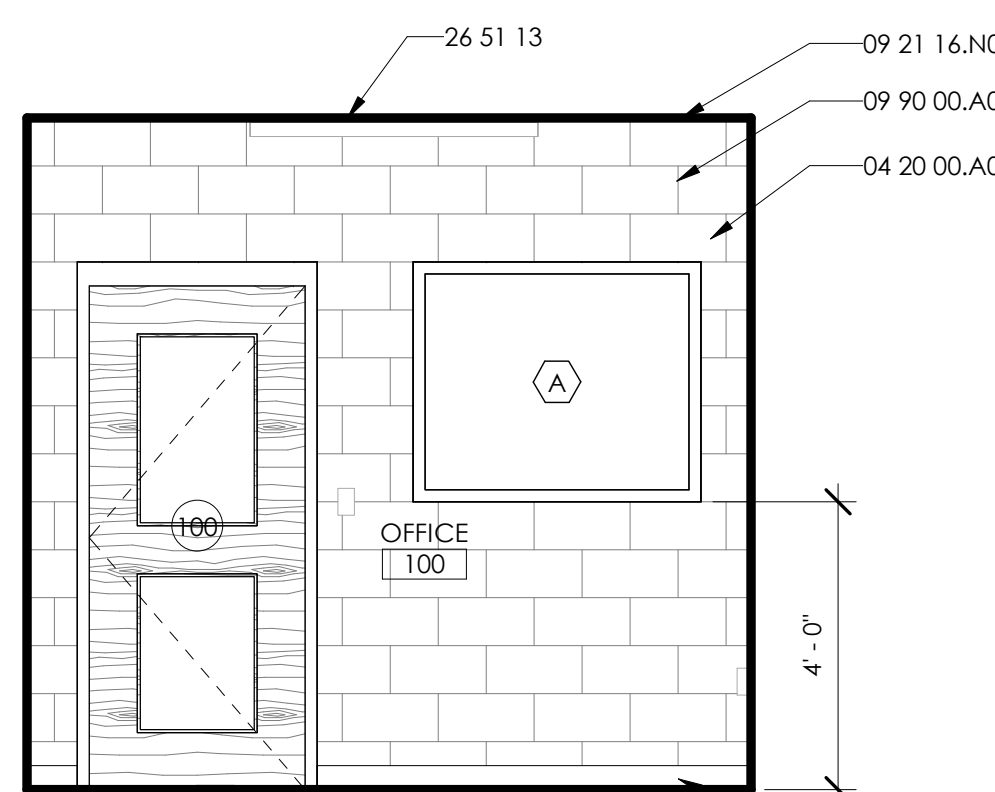
1 ENLARGED FIRST FLOOR PLAN - OFFICE 100
A.300 SCALE: 3/8" = 1'-0" REF: A.101



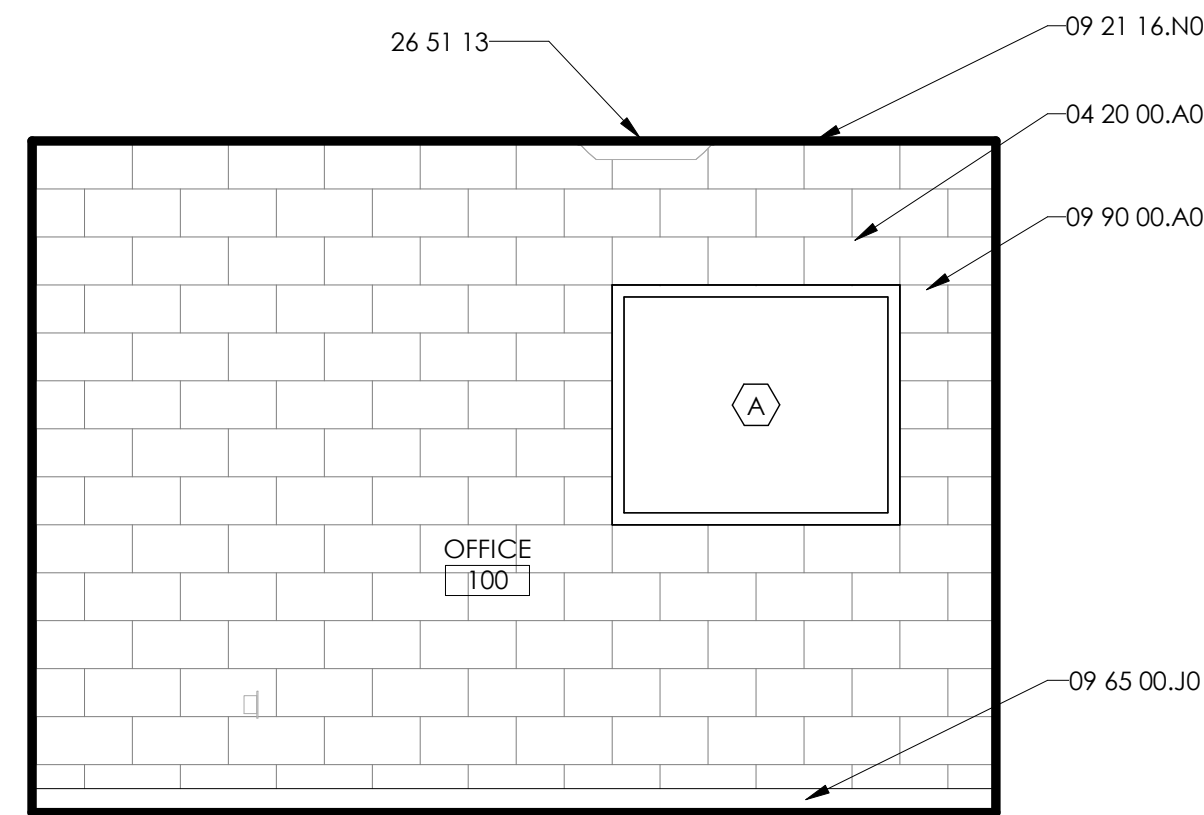
2 ENLARGED REFLECTED CEILING PLAN - OFFICE 100
A.300 SCALE: 3/8" = 1'-0" REF: A.400



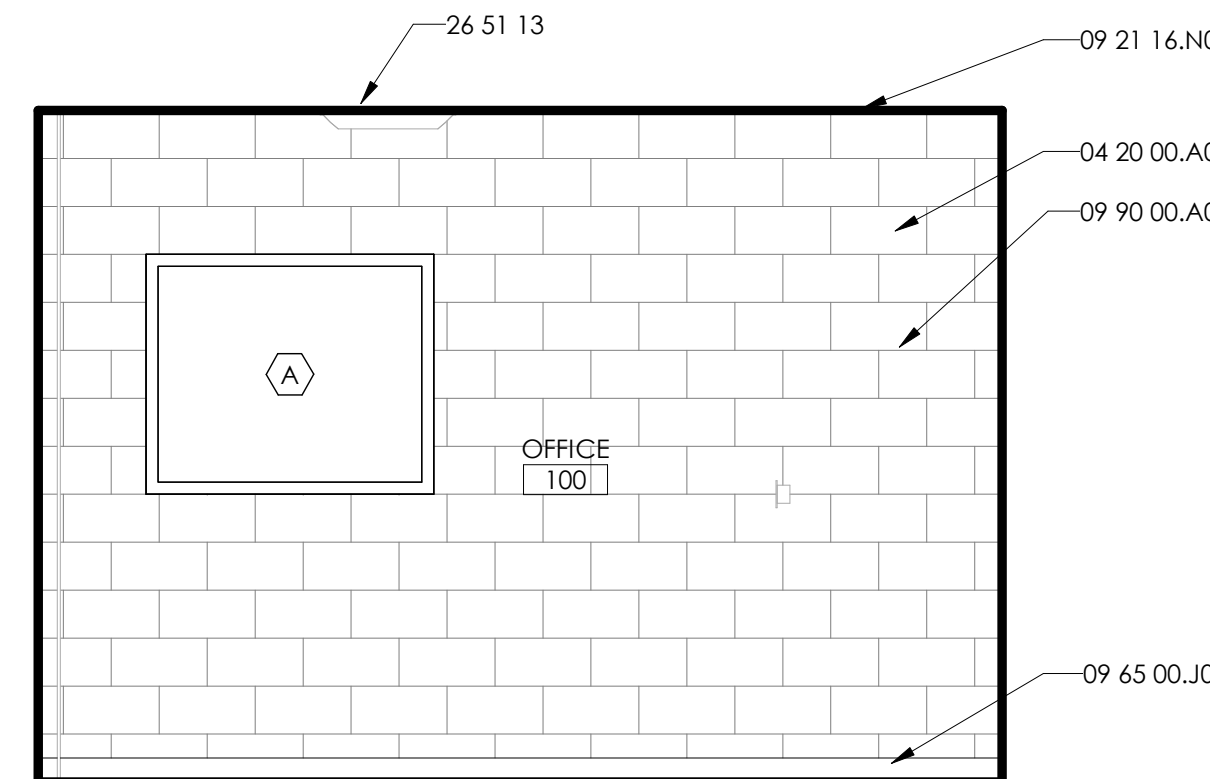
3 PARTIAL NORTH ELEVATION - AUTO WAREHOUSE 101
A.300 SCALE: 3/8" = 1'-0" REF: A.300



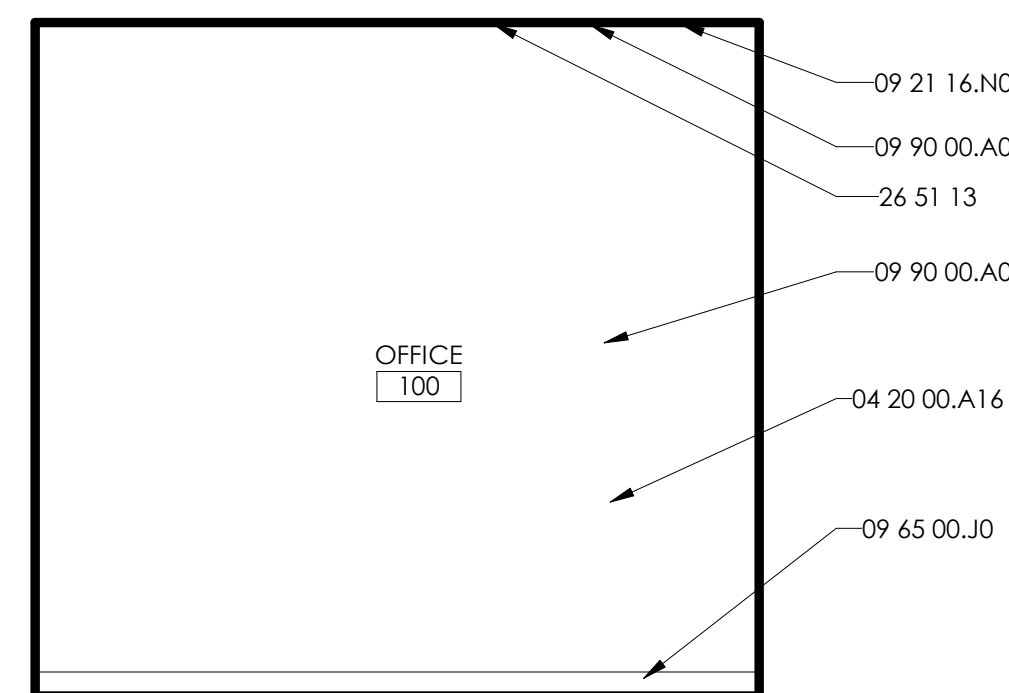
4 SOUTH ELEVATION - OFFICE 100
A.300 SCALE: 3/8" = 1'-0" REF: A.300



5 WEST ELEVATION - OFFICE 100
A.300 SCALE: 3/8" = 1'-0" REF: A.300



6 EAST ELEVATION - OFFICE 100
A.300 SCALE: 3/8" = 1'-0" REF: A.300



7 NORTH ELEVATION - OFFICE 100
A.300 SCALE: 3/8" = 1'-0" REF: A.100

GENERAL NOTES

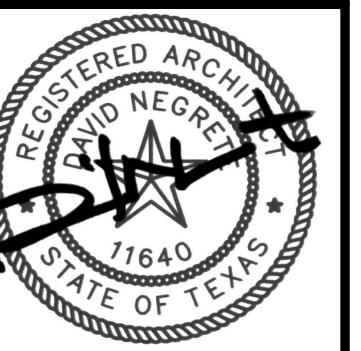
1. REFER TO SHEET G.001 FOR FULL LIST OF REFERENCE NOTES
2. REFER TO STRUCTURAL FOR ADDITIONAL CONCRETE SLAB/FOUNDATION INFORMATION.
3. REFER TO ELECTRICAL FOR ADDITIONAL INFORMATION.
4. REFER TO PLUMBING FOR ADDITIONAL FLOOR DRAIN INFORMATION.

REFERENCE NOTES

- 04 20 00.A0 CMU
04 20 00.A16 8" x 8" x 16" CMU
05 12 23 Structural Steel for Buildings Re: Struct.
06 10 00.P9 3/4" Plywood Sheathing
06 16 00.D0 Plywood
09 21 16.N0 5/8" Gypsum Board
09 65 00.J0 Resilient Base
09 90 00.A0 Interior Paint
22 42 33 Wash Fountains, Re: Plumbing
22 45 33 Combination Emergency Fixture Units, Re: Plumbing
26 51 13 Lighting Fixtures and Lamps, Re: Elec.
Division 26 Electrical

11700 NORTH IH35
AUSTIN, TEXAS 78753
PH: 512.474.6526
FAX: 512.474.6761
204 E. STUBBS
STREET
EDINBURG, TX
PH: 281.384.0611
FAX: 281.384.0613

NEGRETTE & KOLAR
ARCHITECTS^{LLP}



06/07/2019

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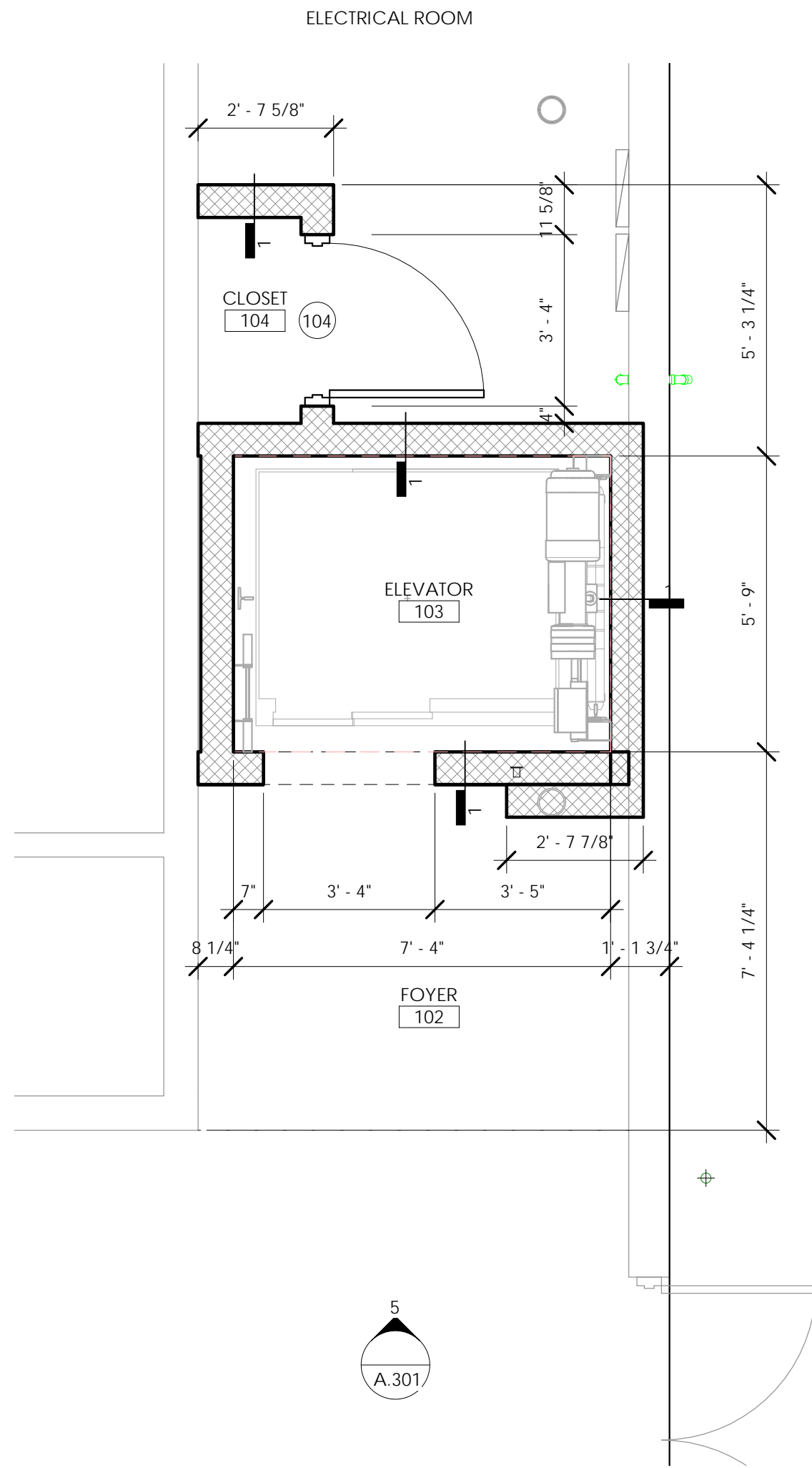
LIST OF ALTERNATES

REFER TO PROJECT MANUAL SECTION 01 20 00

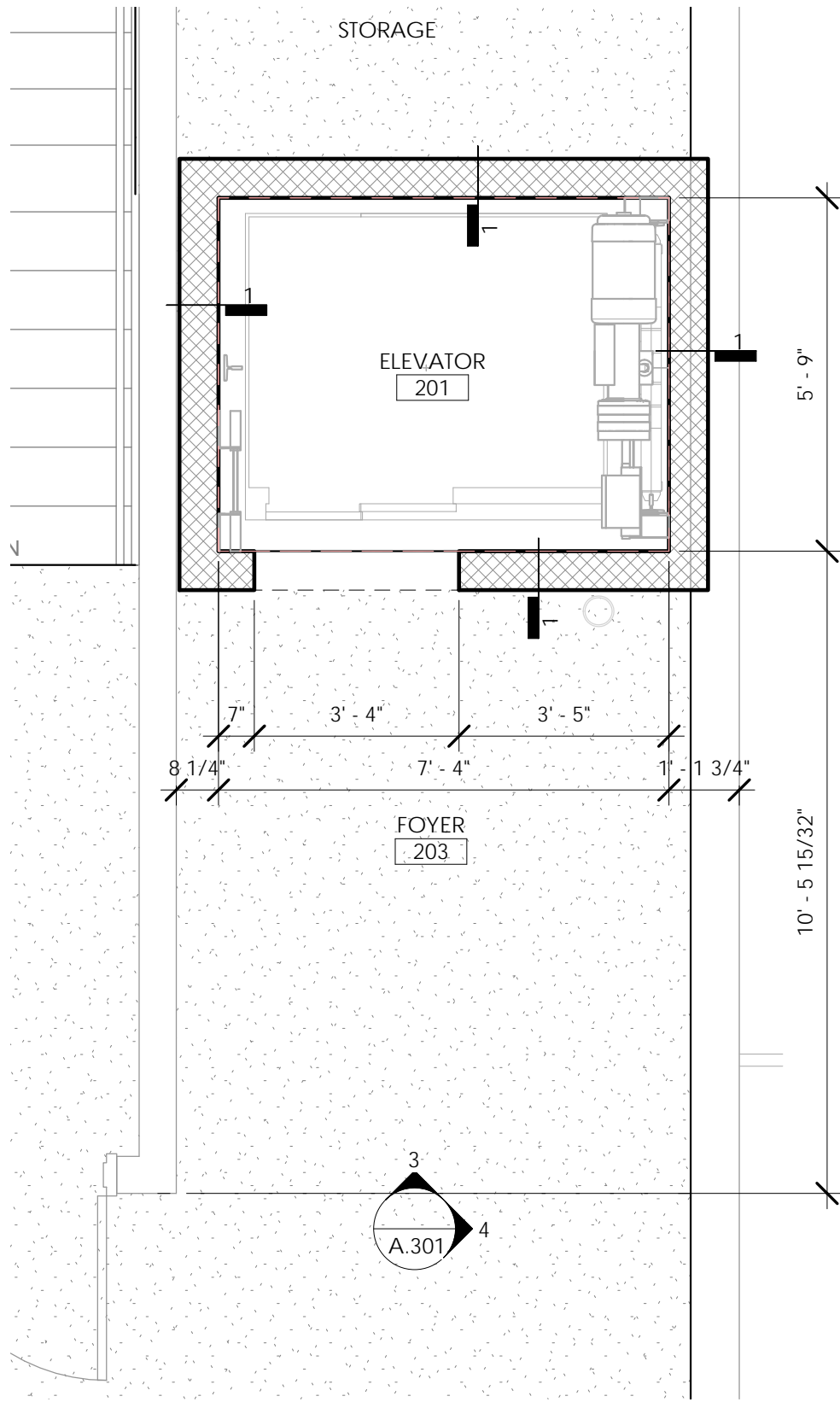
1. ADD NEW ELEVATOR
2. NEW LED LIGHTING AT EXISTING WAREHOUSE
3. REFINISH EXISTING CANOPIES/STRUCTURE

ENLARGED PLAN
& ELEVATIONS

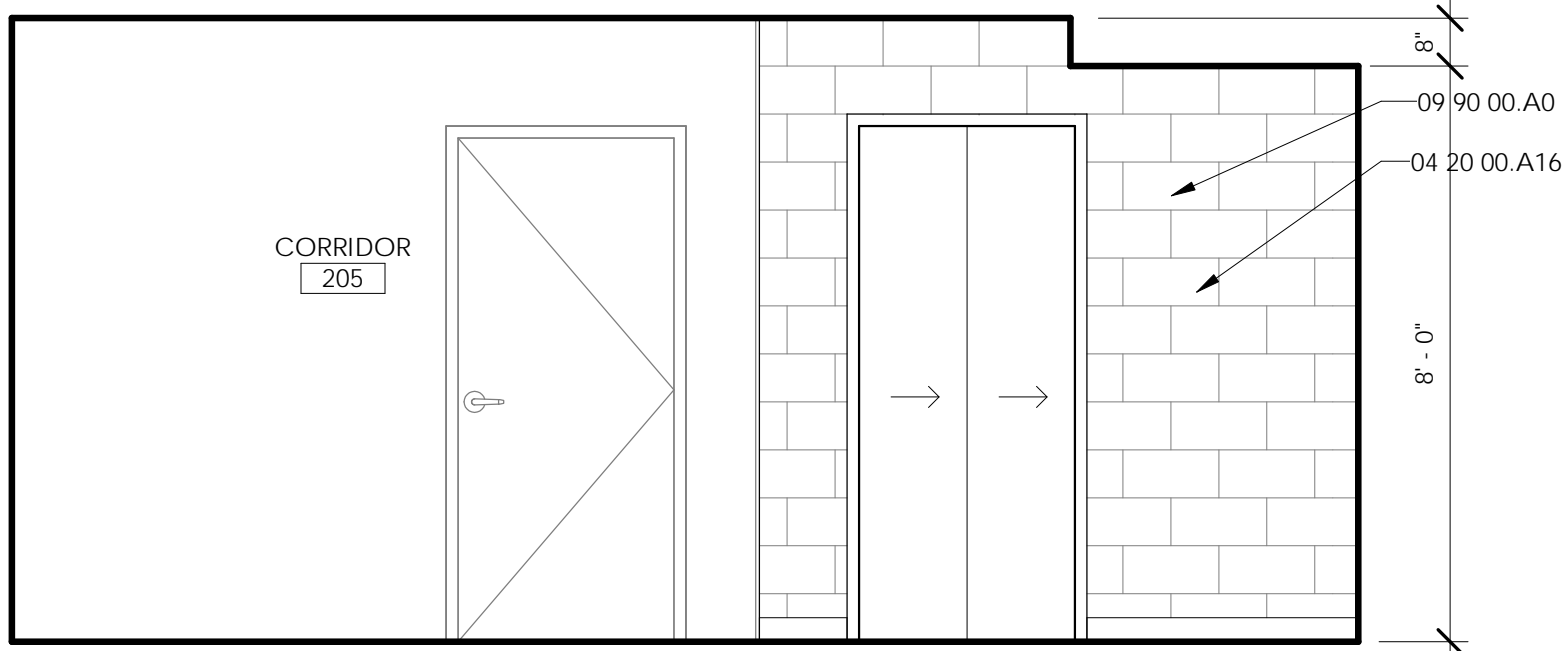
A.300



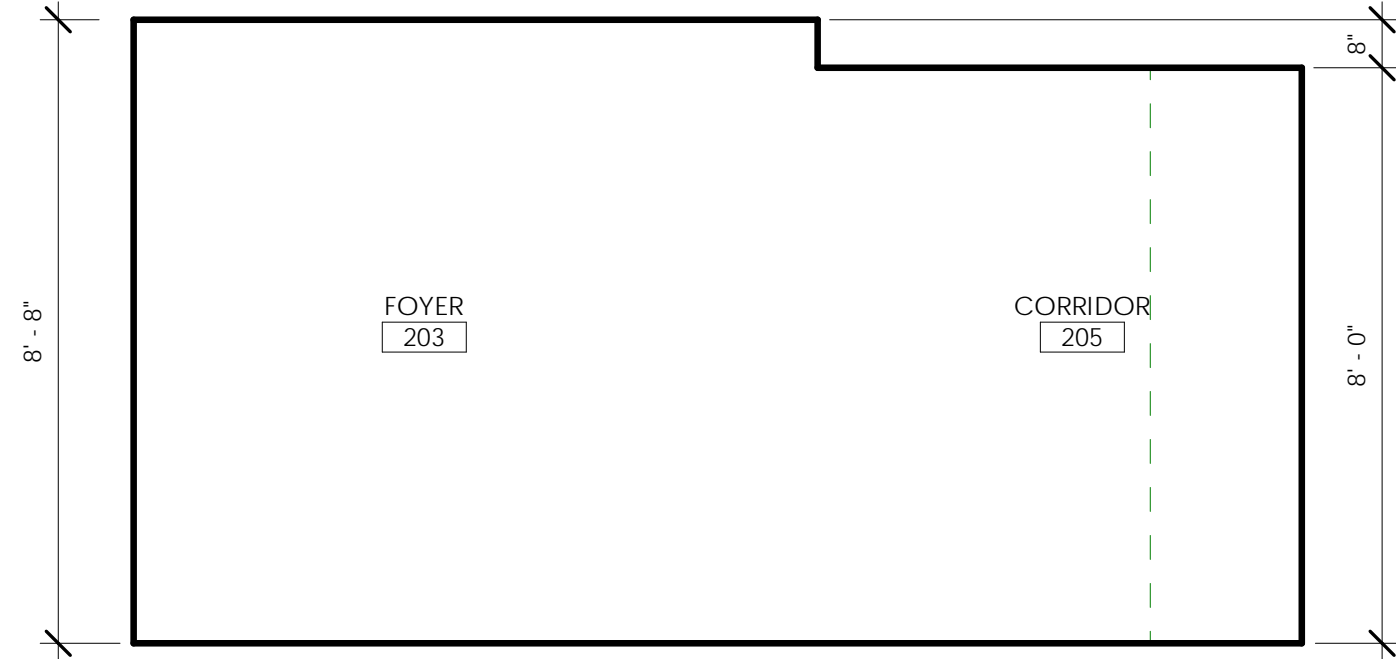
1 ENLARGED FIRST FLOOR PLAN - ELEVATOR ALT #1
A.301 SCALE: 3/8" = 1'-0" REF: A.101



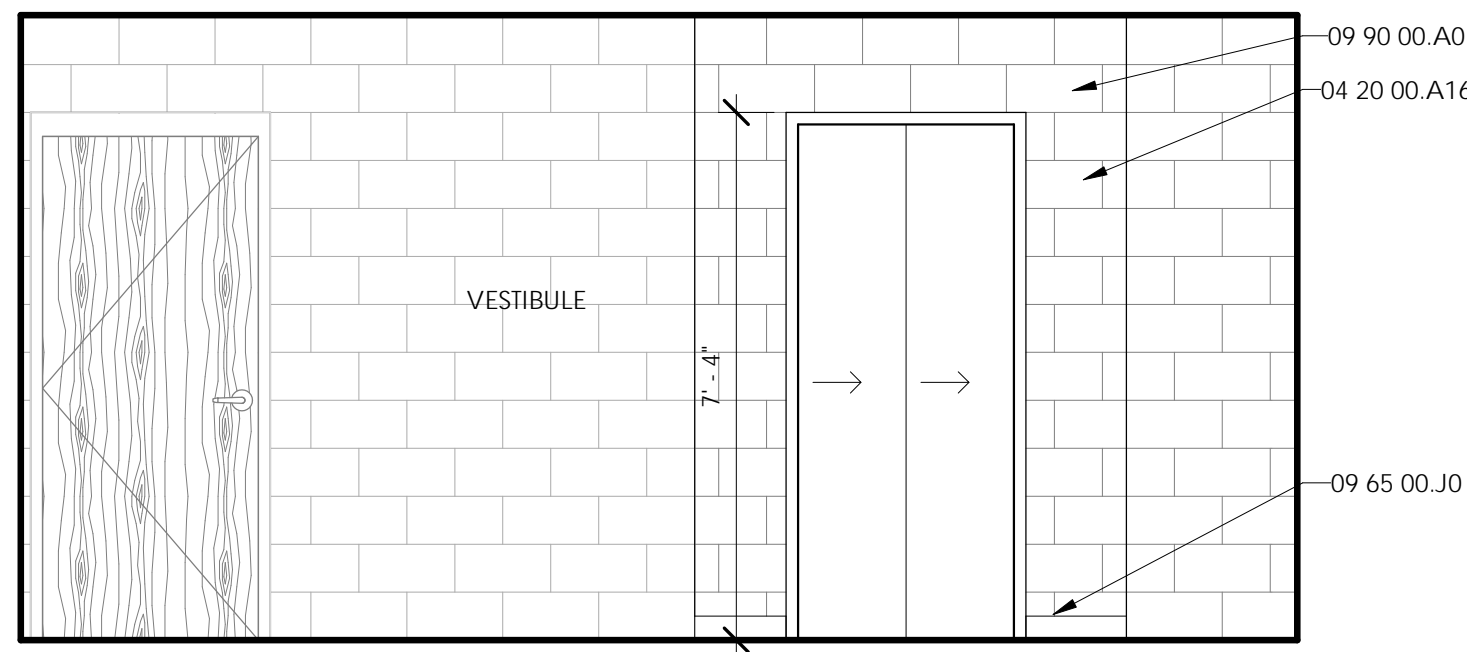
2 ENLARGED SECOND FLOOR PLAN - ELEVATOR ALT #1
A.301 SCALE: 3/8" = 1'-0" REF: A.101



3 INTERIOR NORTH ELEVATION - FOYER 203
A.301 SCALE: 3/8" = 1'-0" REF: A.301



4 INTERIOR EAST ELEVATION - FOYER 203
A.301 SCALE: 3/8" = 1'-0" REF: A.301



5 INTERIOR NORTH ELEVATION - FOYER 102
A.301 SCALE: 3/8" = 1'-0" REF: A.301

GENERAL NOTES

1. REFER TO SHEET G.001 FOR FULL LIST OF REFERENCE NOTES
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3. REFER TO ELECTRICAL FOR ADDITIONAL INFORMATION.
4. REFER TO PLUMBING FOR ADDITIONAL FLOOR DRAIN INFORMATION.

REFERENCE NOTES

- 04 20 00.A16 8" x 8" x 16" CMU
- 09 65 00.J0 Resilient Base
- 09 90 00.A0 Interior Paint

11720 NORTH HIRE
AUSTIN, TEXAS 78753
PH: 512.474.6526
FAX: 512.474.6761
204 E. STUBBS
STREET
EDINBURG, TX
77555-3864
PH: 281.386.0611
FAX: 281.386.0613

NEGRETE & KOLAR
ARCHITECTS^{LLP}



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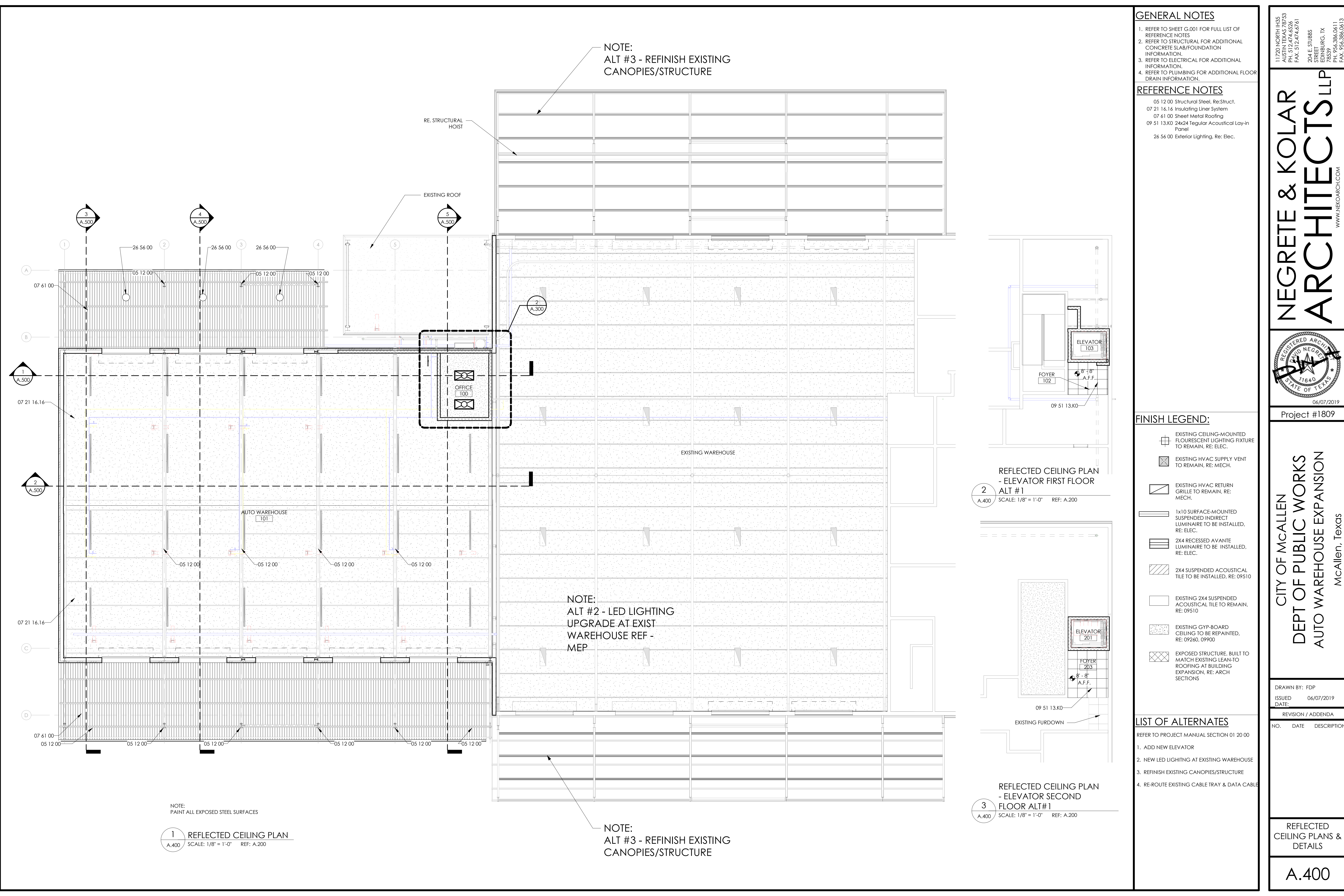
ENLARGED
PLANS &
ELEVATIONS

A.301

LIST OF ALTERNATES

REFER TO PROJECT MANUAL SECTION 01 20 00

1. ADD NEW ELEVATOR
2. NEW LED LIGHTING AT EXISTING WAREHOUSE
3. REFINISH EXISTING CANOPIES/STRUCTURE



GENERAL NOTES

1. REFER TO SHEET G.001 FOR FULL LIST OF REFERENCE NOTES
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3. REFER TO ELECTRICAL FOR ADDITIONAL INFORMATION.
4. REFER TO PLUMBING FOR ADDITIONAL FLOOR DRAIN INFORMATION.

REFERENCE NOTES

- 05 12 00 Structural Steel, Re:Struct.
07 21 16.16 Insulating Liner System
07 61 00 Sheet Metal Roofing
09 51 13.K0 24x24 Tegular Acoustical Lay-in Panel
26 56 00 Exterior Lighting, Re: Elec.

FINISH LEGEND:

- EXISTING CEILING-MOUNTED FLOURESCENT LIGHTING FIXTURE TO REMAIN, RE: ELEC.
- EXISTING HVAC SUPPLY VENT TO REMAIN, RE: MECH.
- EXISTING HVAC RETURN GRILLE TO REMAIN, RE: MECH.
- 1x10 SURFACE-MOUNTED SUSPENDED INDIRECT LUMINAIRE TO BE INSTALLED, RE: ELEC.
- 2X4 RECESSED AVANTE LUMINAIRE TO BE INSTALLED, RE: ELEC.
- 2X4 SUSPENDED ACOUSTICAL TILE TO BE INSTALLED, RE: 09510
- EXISTING 2X4 SUSPENDED ACOUSTICAL TILE TO REMAIN, RE: 09510
- EXISTING GYP-BOARD CEILING TO BE REPAINTED, RE: 09260, 09900
- EXPOSED STRUCTURE, BUILT TO MATCH EXISTING LEAN-TO ROOFING AT BUILDING EXPANSION, RE: ARCH SECTIONS

LIST OF ALTERNATES

- REFER TO PROJECT MANUAL SECTION 01 20 00
1. ADD NEW ELEVATOR
 2. NEW LED LIGHTING AT EXISTING WAREHOUSE
 3. REFINISH EXISTING CANOPIES/STRUCTURE
 4. RE-ROUTE EXISTING CABLE TRAY & DATA CABLE

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AUSTIN, TEXAS 78753
PH: 512.474.6526
FAX: 512.474.6761
204 E. STUBBS
STREET
EDINBURG, TX
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FAX: 281.384.0413

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ARCHITECTS^{LLP}
WWW.NEKOARCH.COM



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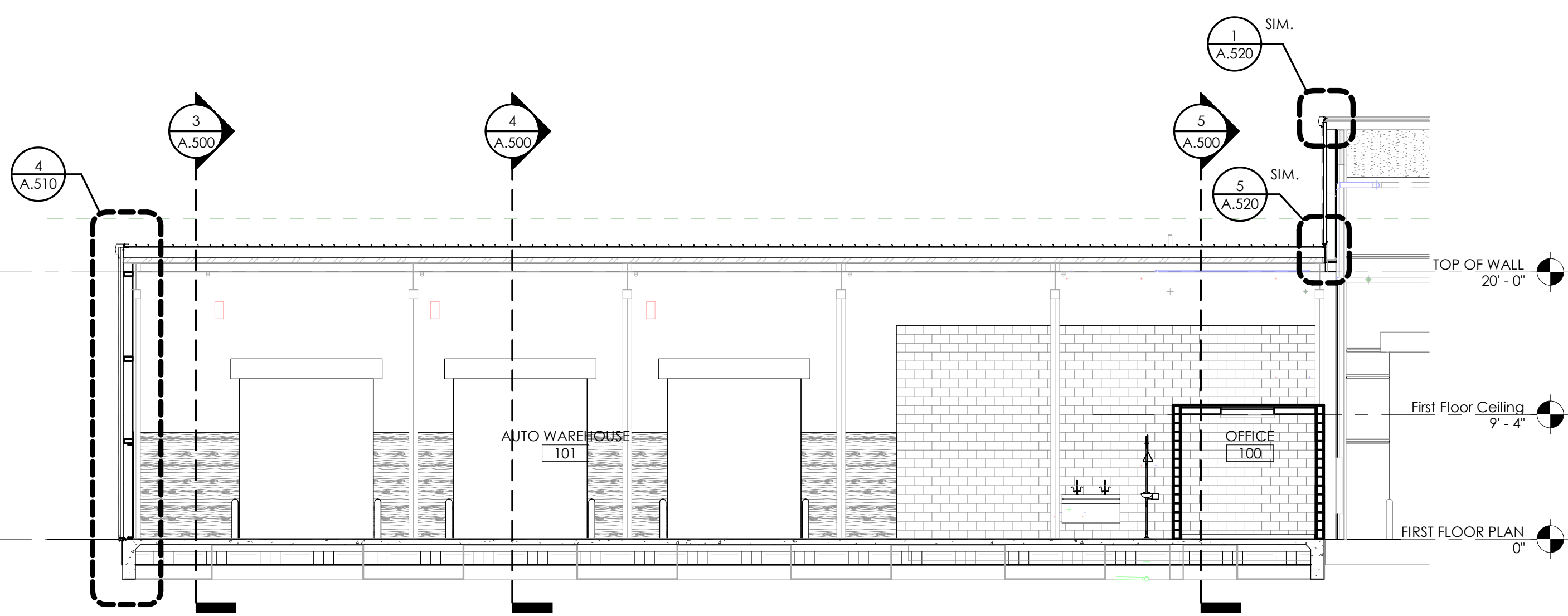
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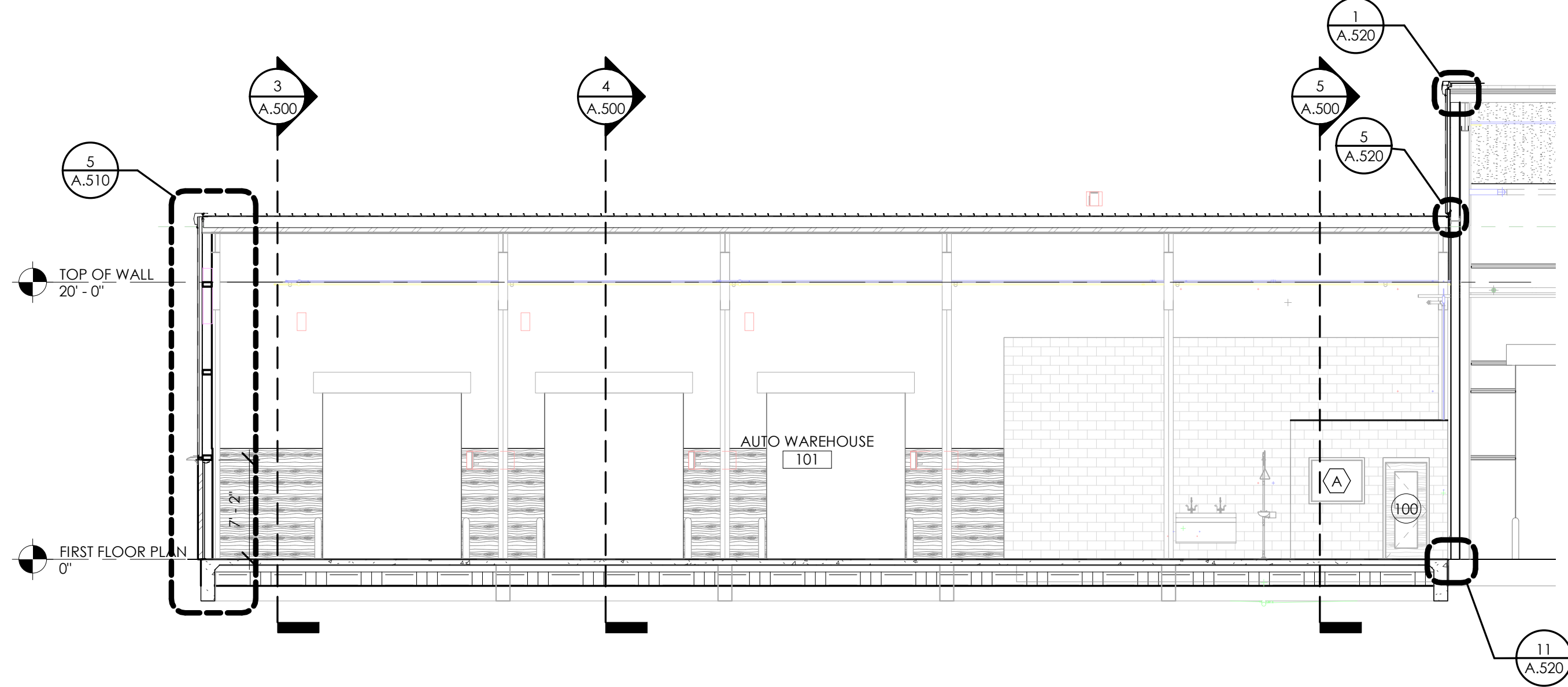
REVISION / ADDENDA
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REFLECTED
CEILING PLANS &
DETAILS

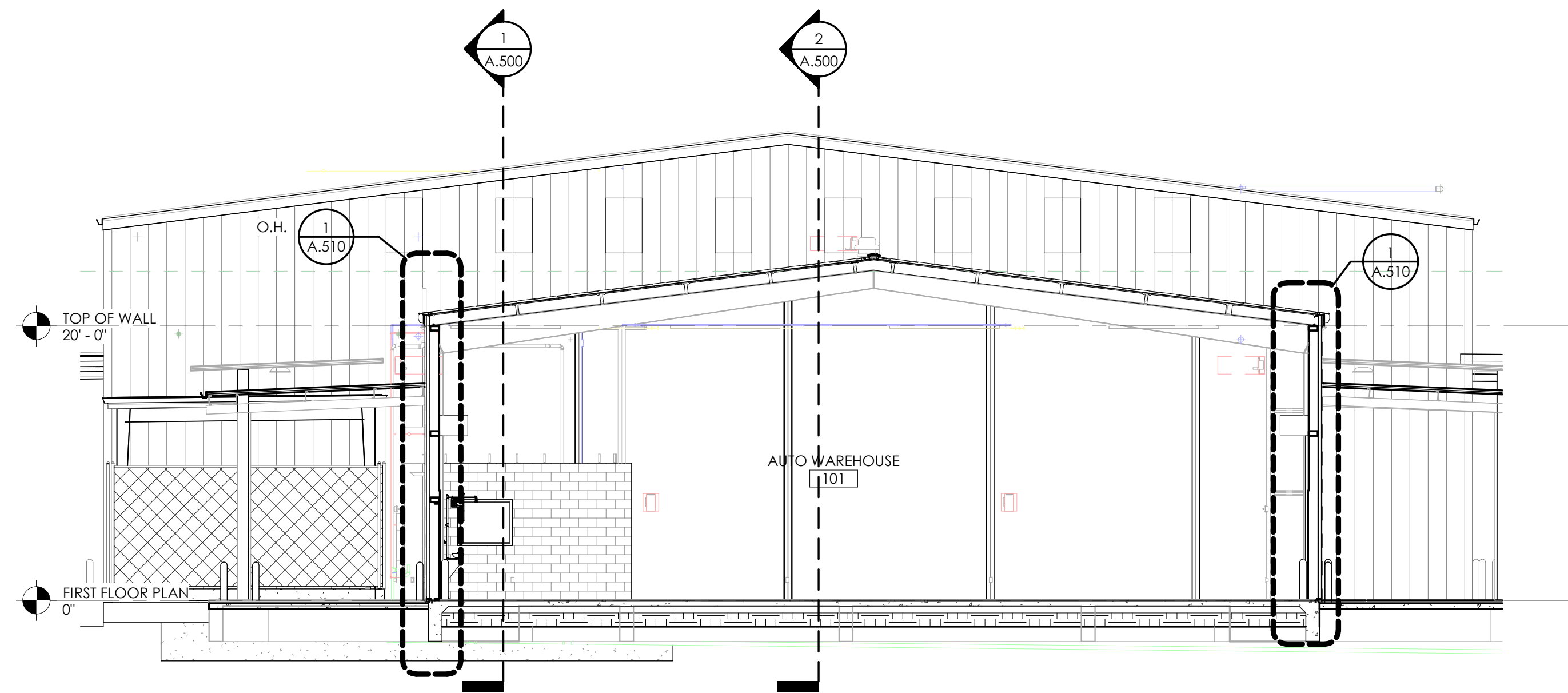
A.400



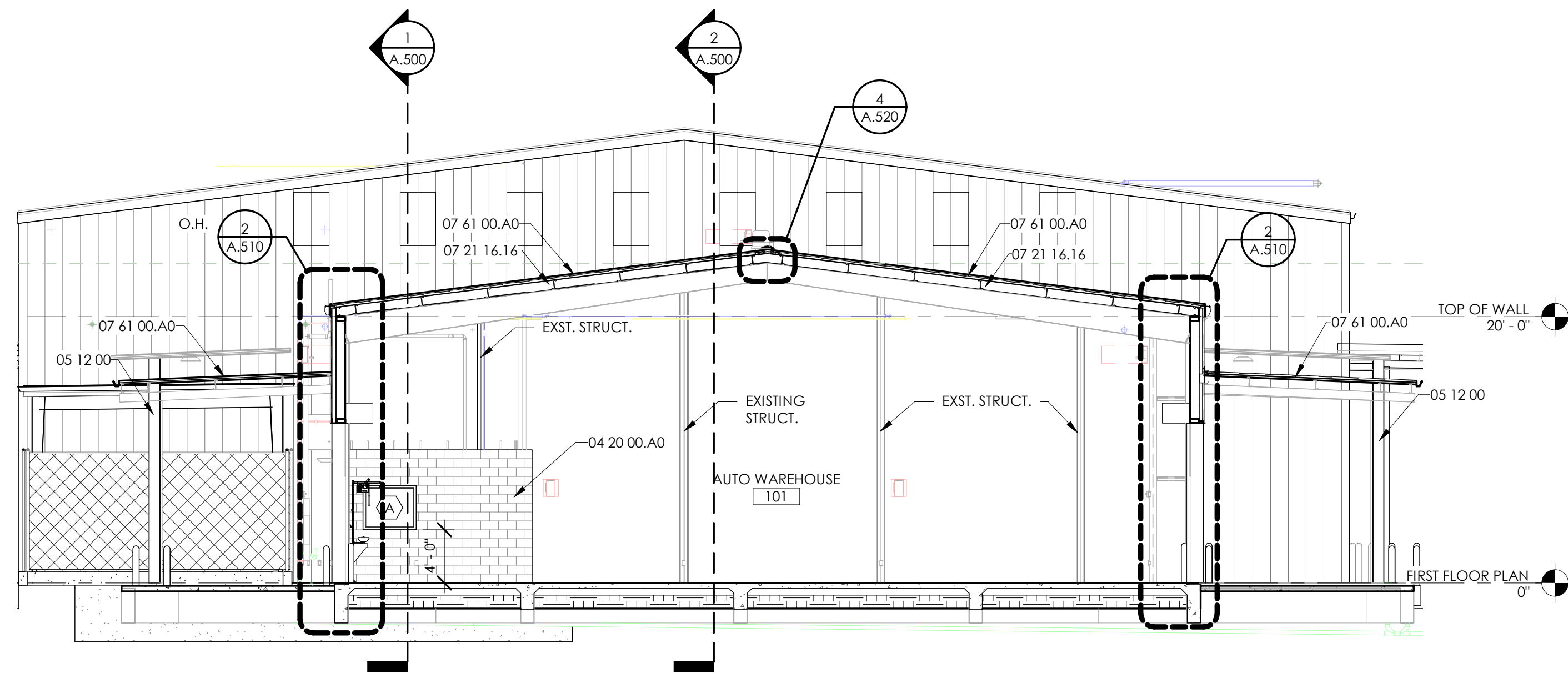
1 WEST/EAST BUILDING SECTION
A.500 SCALE: 1/8" = 1'-0" REF: A.101



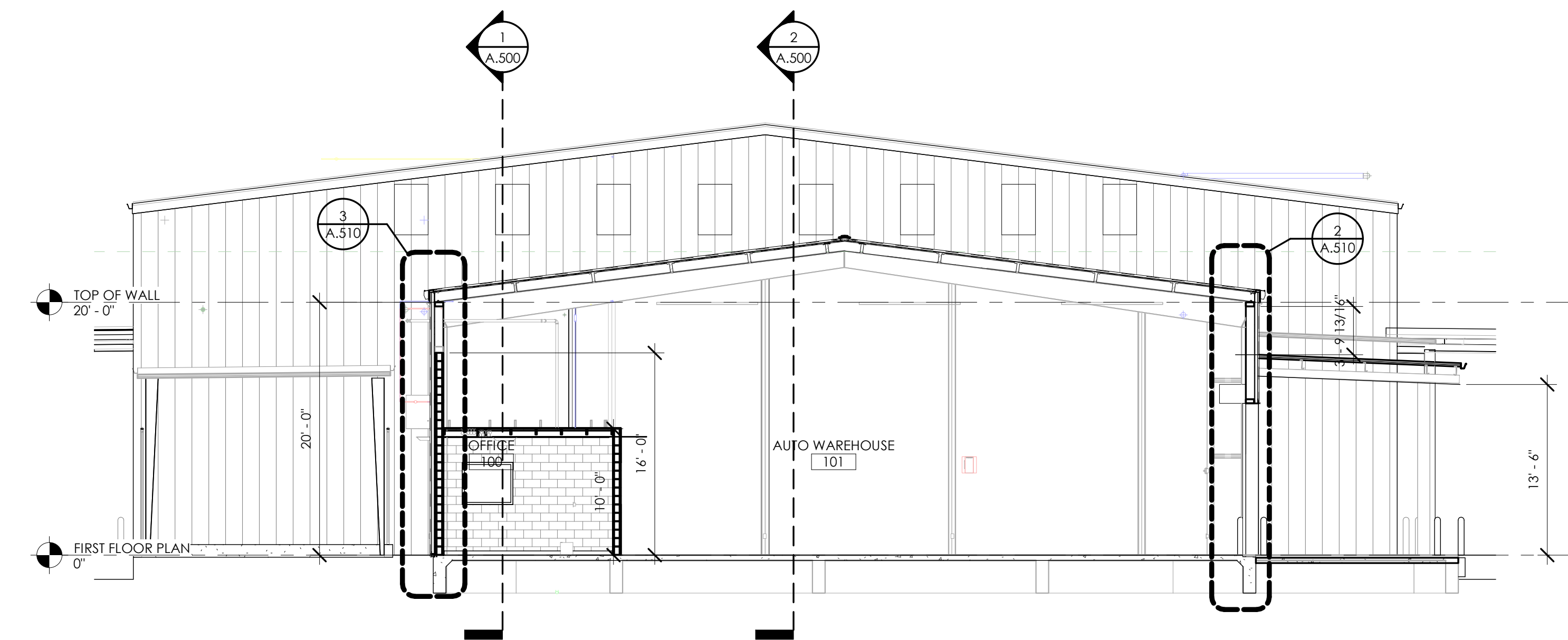
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A.500 SCALE: 1/8" = 1'-0" REF: A.101



3 NORTH/SOUTH BUILDING SECTION
A.500 SCALE: 1/8" = 1'-0" REF: A.101



4 NORTH/SOUTH BUILDING SECTION 2
A.500 SCALE: 1/8" = 1'-0" REF: A.101



5 NORTH/SOUTH BUILDING SECTION 3
A.500 SCALE: 1/8" = 1'-0" REF: A.101

GENERAL NOTES

1. REFER TO SHEET G.001 FOR FULL LIST OF REFERENCE NOTES
2. REFER TO STRUCTURAL FOR ADDITIONAL CONCRETE SLAB/FOUNDATION INFORMATION.
3. REFER TO ELECTRICAL FOR ADDITIONAL INFORMATION.
4. REFER TO PLUMBING FOR ADDITIONAL FLOOR DRAIN INFORMATION.

REFERENCE NOTES

- 04 20 00.A0 CMU
05 12 00 Structural Steel, Re:Struct.
07 21 16.16 Insulating Liner System
07 61 00.A0 Standing Seam Seamed Roofing Panel

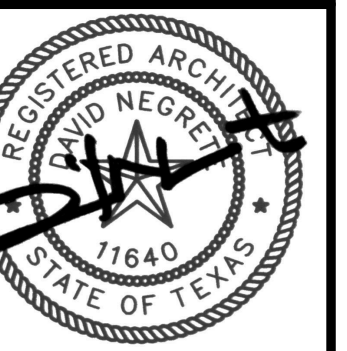
NOTE:
PAINT ALL EXPOSED STEEL SURFACES

LIST OF ALTERNATES

- REFER TO PROJECT MANUAL SECTION 01 20 00
1. ADD NEW ELEVATOR
 2. NEW LED LIGHTING AT EXISTING WAREHOUSE
 3. REFINISH EXISTING CANOPIES/STRUCTURE

11700 NORTH HARRIS
AUSTIN, TEXAS 78753
PH: 512.474.6526
FAX: 512.474.6761
204 E. STUBBS
STREET
EDINBURG, TX
PH: 956.384.0611
FAX: 956.386.0613

NEGRETTE & KOLAR
ARCHITECTS^{LLP}
WWW.NEKOARCH.COM



06/07/2019

Project #1809

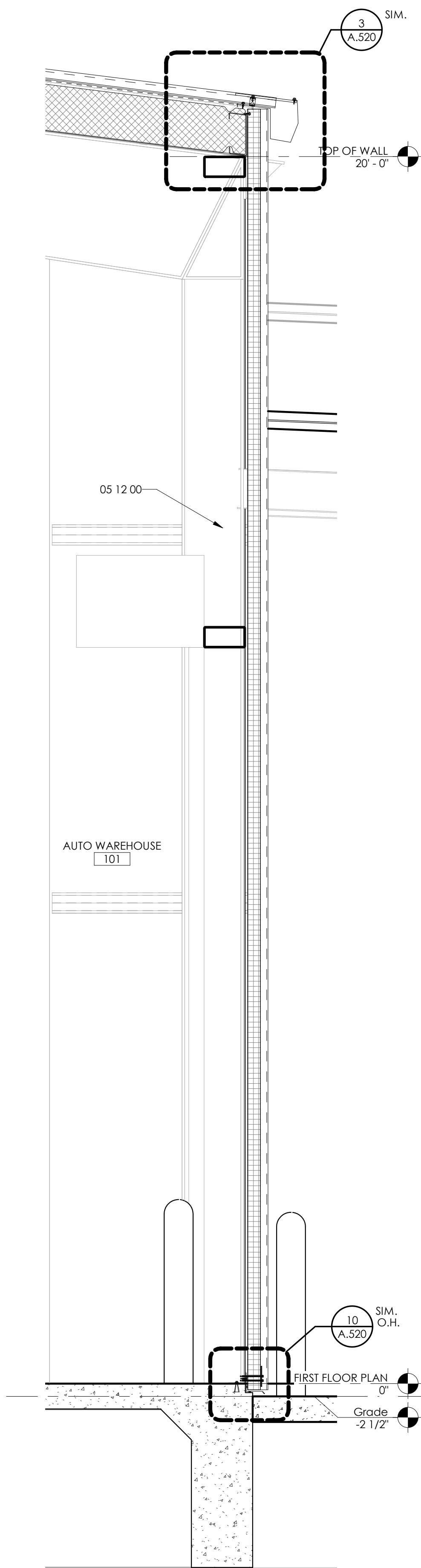
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DEPT OF PUBLIC WORKS
AUTO WAREHOUSE EXPANSION
McAllen, Texas

DRAWN BY: FDP
ISSUED: 06/07/2019
DATE:

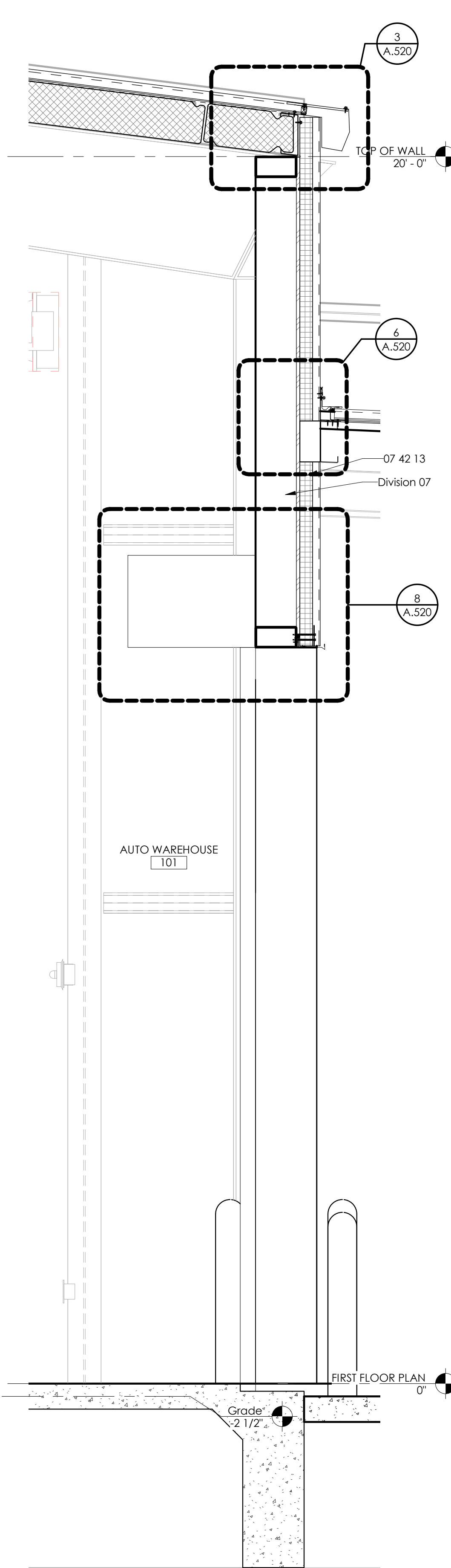
REVISION / ADDENDA
NO. DATE DESCRIPTION

BUILDING &
WALL SECTIONS

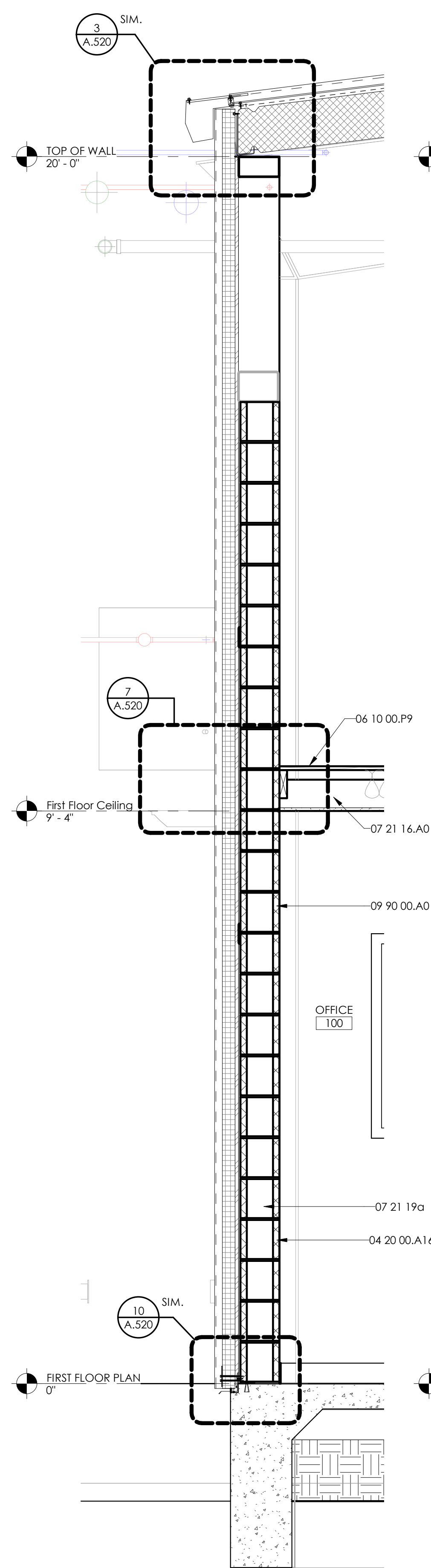
A.500



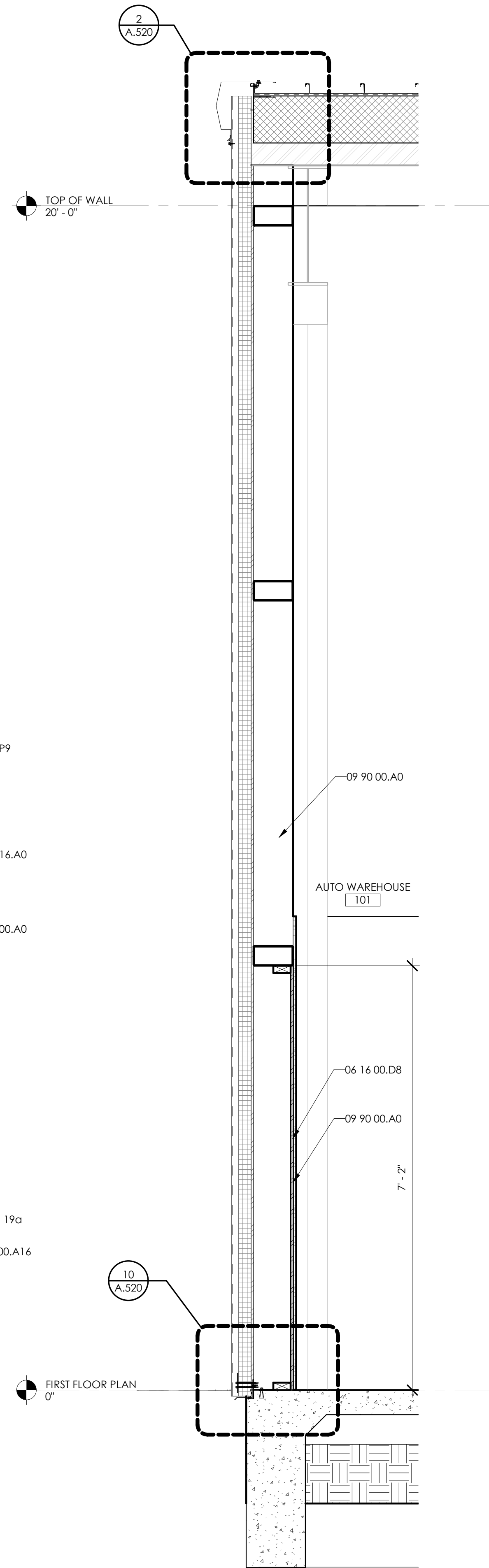
1 NORTH/SOUTH WALL SECTION
A.510 SCALE: 3/4" = 1'-0" REF: A.500



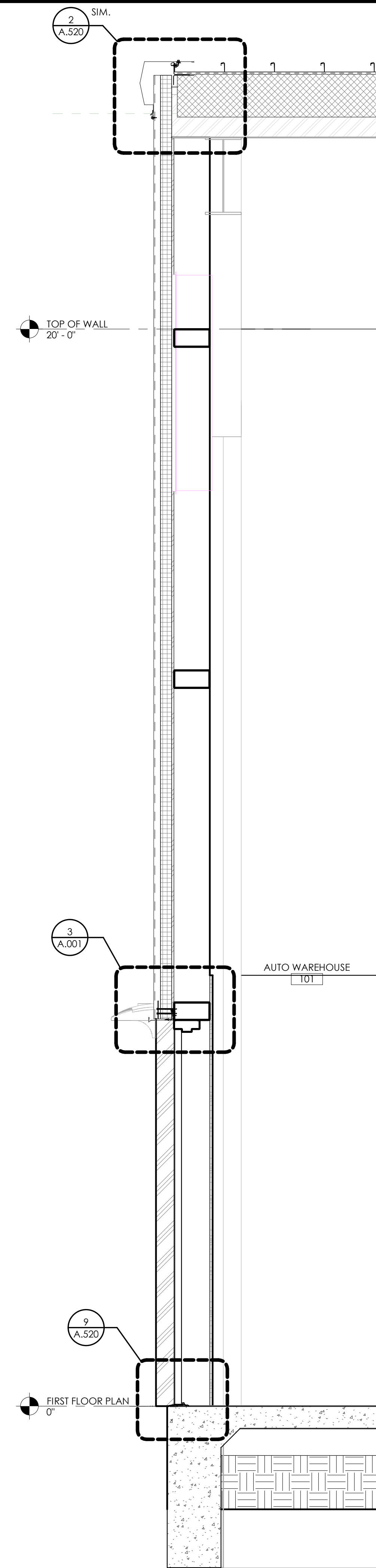
2 NORTH/SOUTH WALL SECTION 2
A.510 SCALE: 3/4" = 1'-0" REF: A.500



3 NORTH/SOUTH WALL SECTION 3
A.510 SCALE: 3/4" = 1'-0" REF: A.500



4 WEST/EAST WALL SECTION
A.510 SCALE: 3/4" = 1'-0" REF: A.500



5 WEST/EAST WALL SECTION 2
A.510 SCALE: 3/4" = 1'-0" REF: A.500

GENERAL NOTES

1. REFER TO SHEET G.001 FOR FULL LIST OF REFERENCE NOTES
2. REFER TO STRUCTURAL FOR ADDITIONAL CONCRETE SLAB/FOUNDATION INFORMATION.
3. REFER TO ELECTRICAL FOR ADDITIONAL INFORMATION.
4. REFER TO PLUMBING FOR ADDITIONAL FLOOR DRAIN INFORMATION.

REFERENCE NOTES

- 04 20 00.A16 8" x 8" x 16" CMU
05 12 00 Structural Steel, Re:Struct.
06 10 00.P9 3/4" Plywood Sheathing
06 14 00.D8 5/8" Plywood
07 21 14.A0 Sound Batt Insulation
07 21 19a Foamed-In-Place Insulation
07 42 13 Metal Wall Panels
09 90 00.A0 Interior Paint
Division 07 Thermal and Moisture Protection

NOTE:
PAINT ALL EXPOSED STEEL SURFACES

LIST OF ALTERNATES

REFER TO PROJECT MANUAL SECTION 01 20 00

1. ADD NEW ELEVATOR
2. NEW LED LIGHTING AT EXISTING WAREHOUSE
3. REFINISH EXISTING CANOPIES/STRUCTURE

11700 NORTH IH35
AUSTIN, TEXAS 78753
PH: 512.474.6526
FAX: 512.474.6761
204 E. STUBBS
STREET
EDINBURG, TX
PH: 281.384.0411
FAX: 281.384.0413

NEGRETTE & KOLAR
ARCHITECTS^{LLP}
WWW.NEKOARCH.COM



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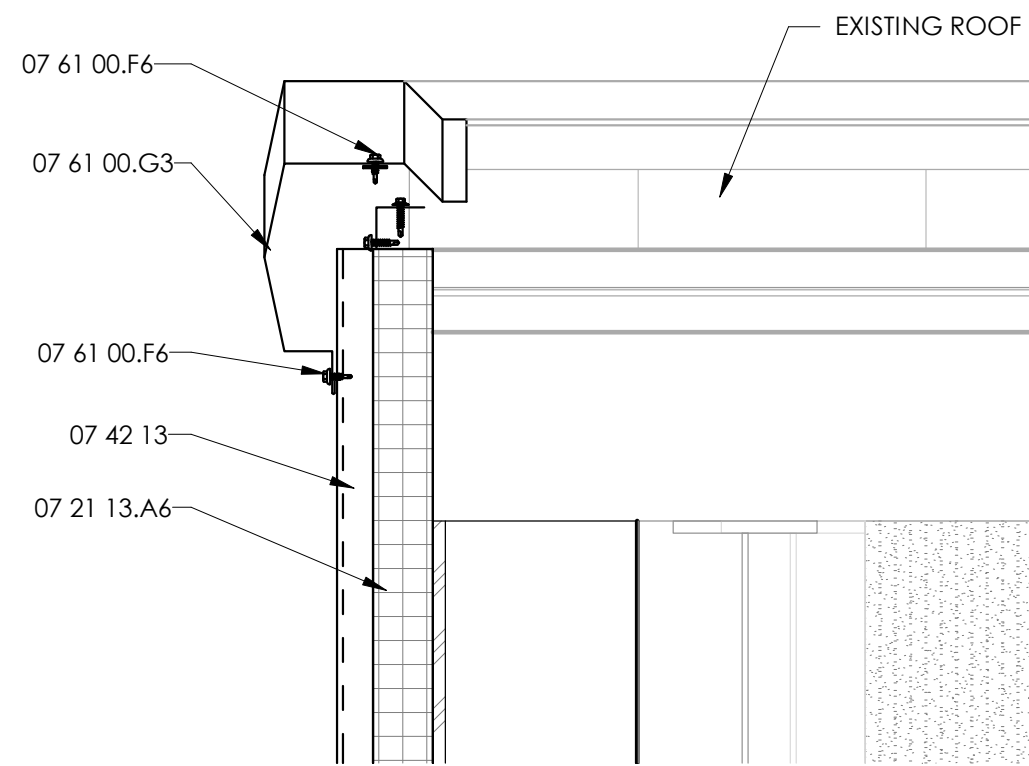
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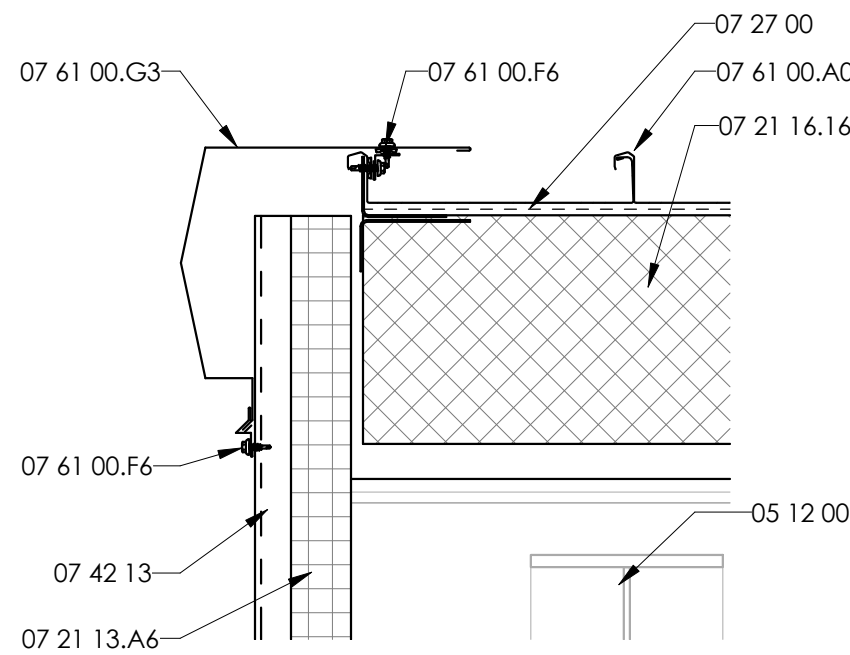
REVISION / ADDENDA
NO. DATE DESCRIPTION

WALL SECTIONS

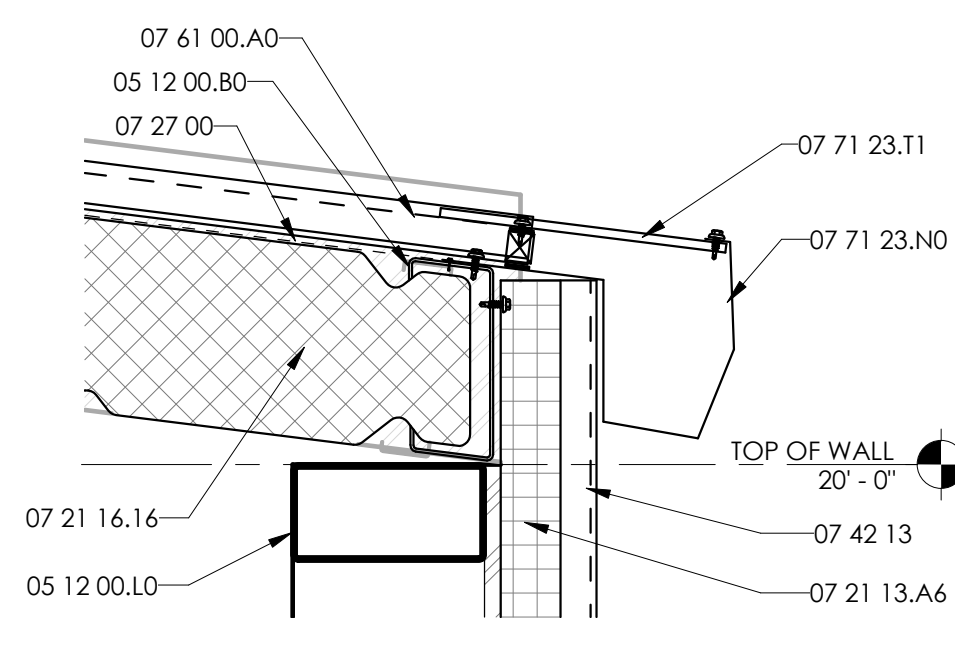
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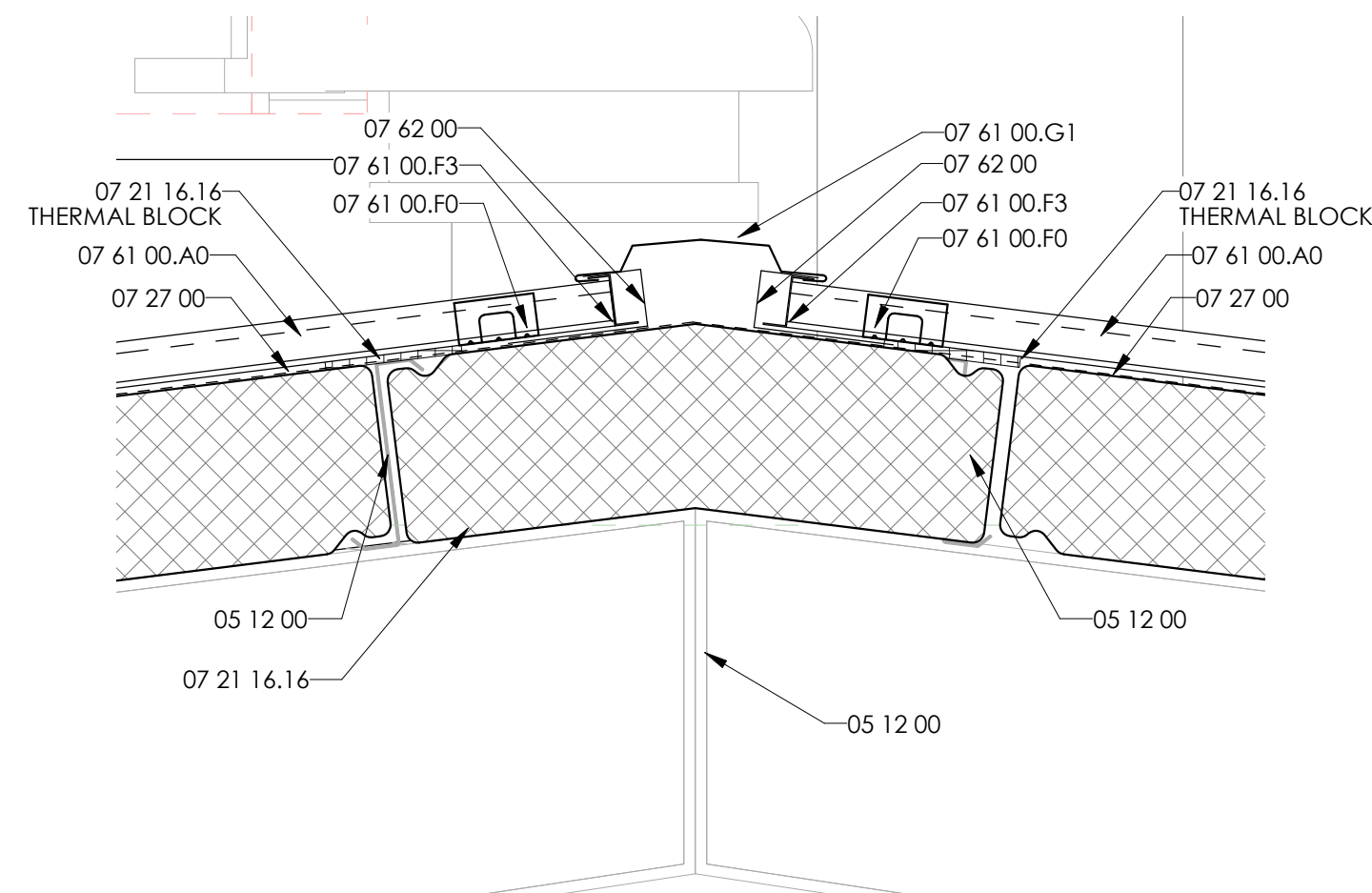
1 NEW ROOF EDGE SECTION DETAIL AT EXISING WAREHOUSE
A.520 SCALE: 1 1/2" = 1'-0" REF: A.500



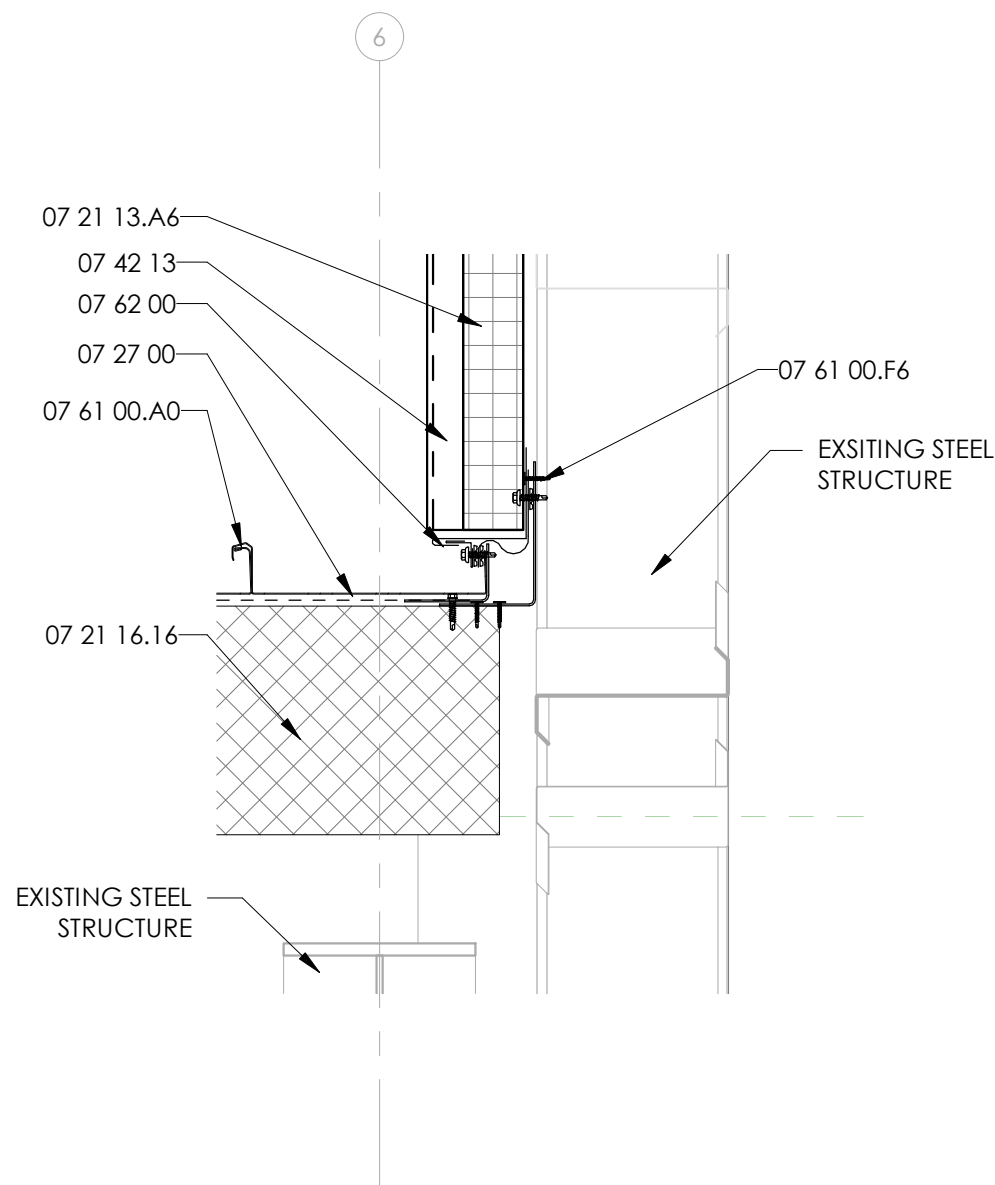
2 NEW ROOF EDGE SECTION DETAIL
A.520 SCALE: 1 1/2" = 1'-0" REF: A.510



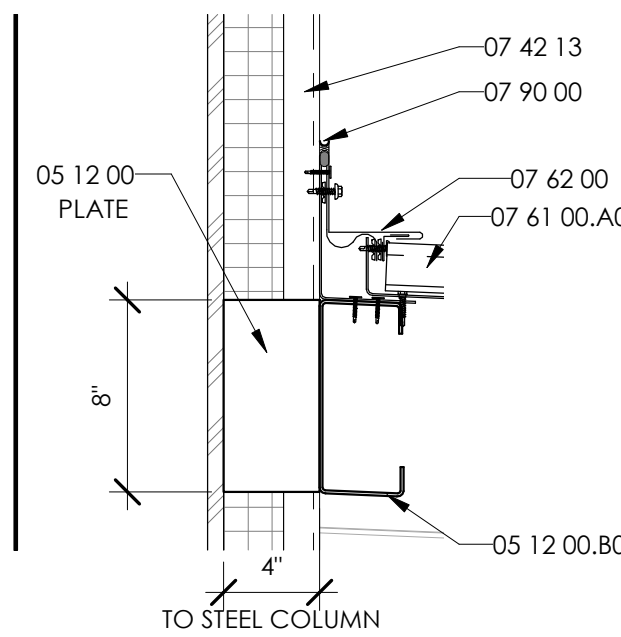
3 ROOF EAVE SECTION DETAIL
A.520 SCALE: 1 1/2" = 1'-0" REF: A.510



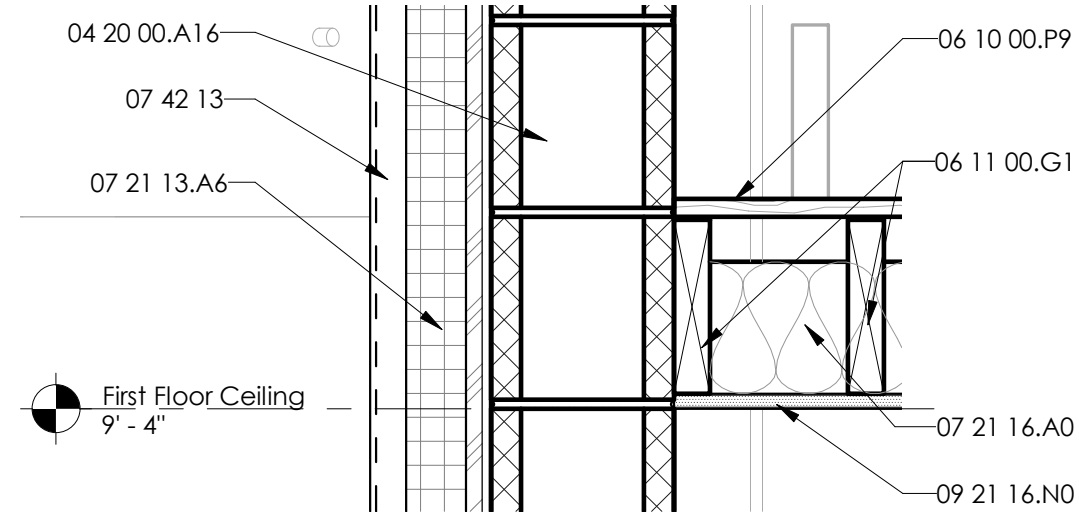
4 ROOF RIDGE SECTION DETAIL
A.520 SCALE: 1 1/2" = 1'-0" REF: A.500



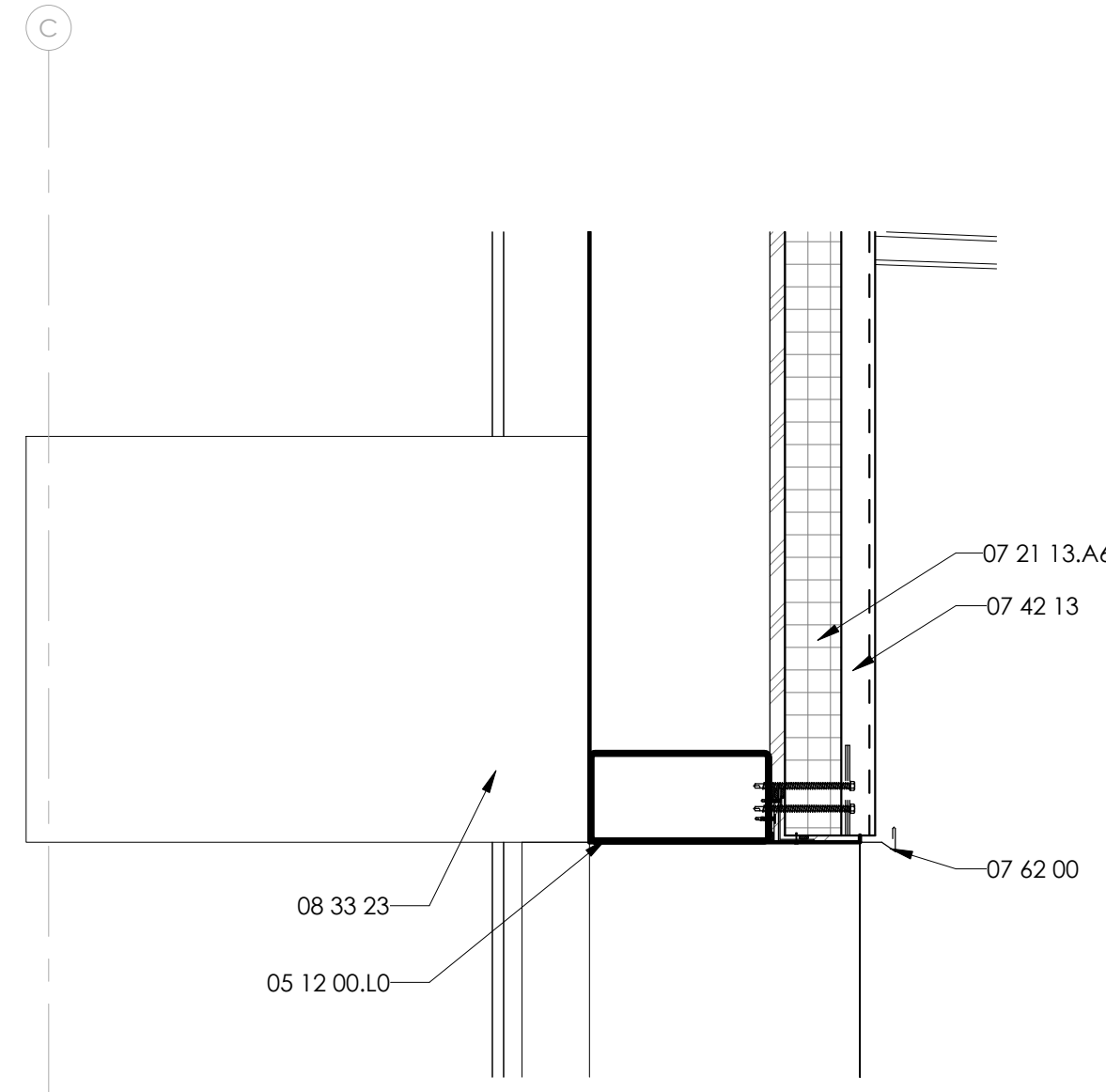
5 METAL PANEL @ ROOF CONNECTION
A.520 SCALE: 1 1/2" = 1'-0" REF: A.500



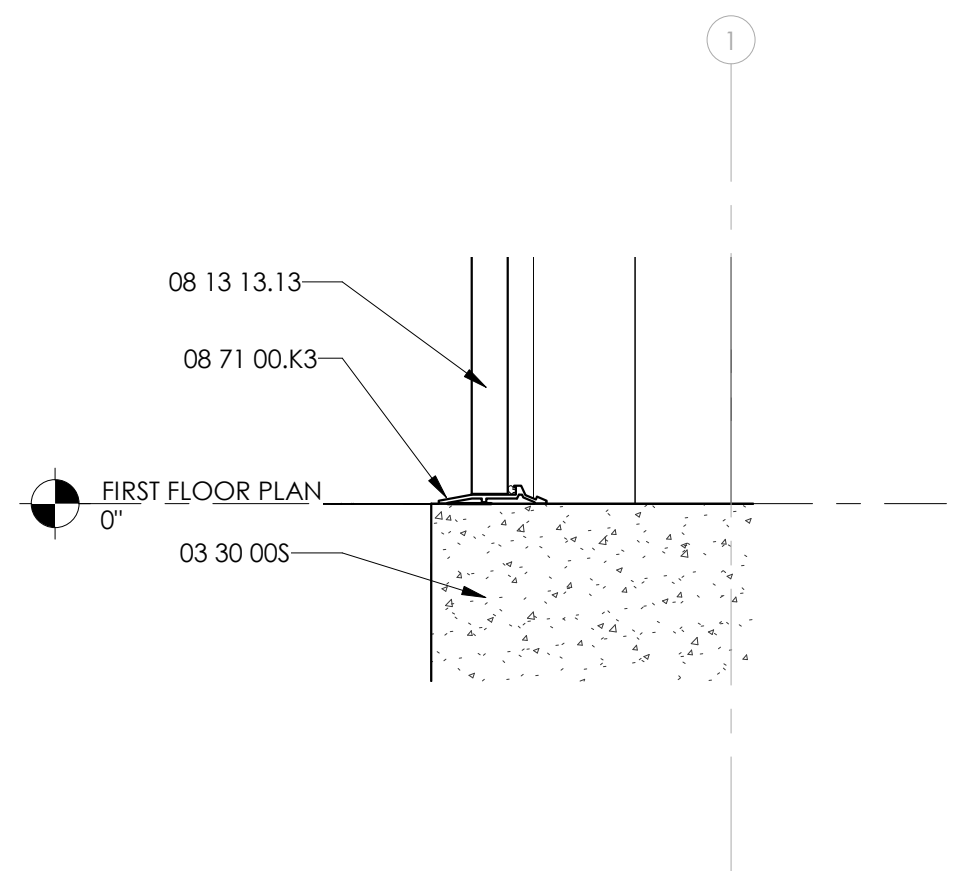
6 NORTH/SOUTH WALL SECTION - Callout 1
A.520 SCALE: 1 1/2" = 1'-0" REF: A.510



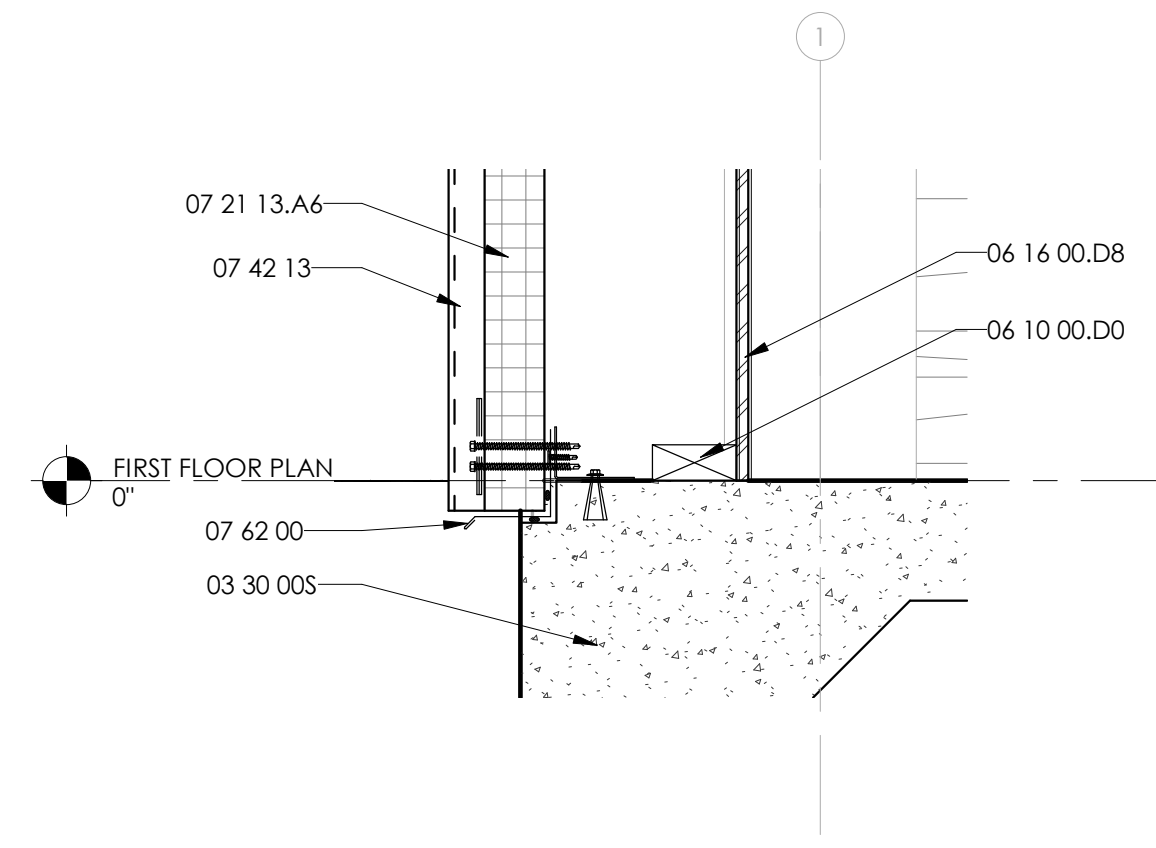
7 METAL PANEL @ CMU DETAIL
A.520 SCALE: 1 1/2" = 1'-0" REF: A.510



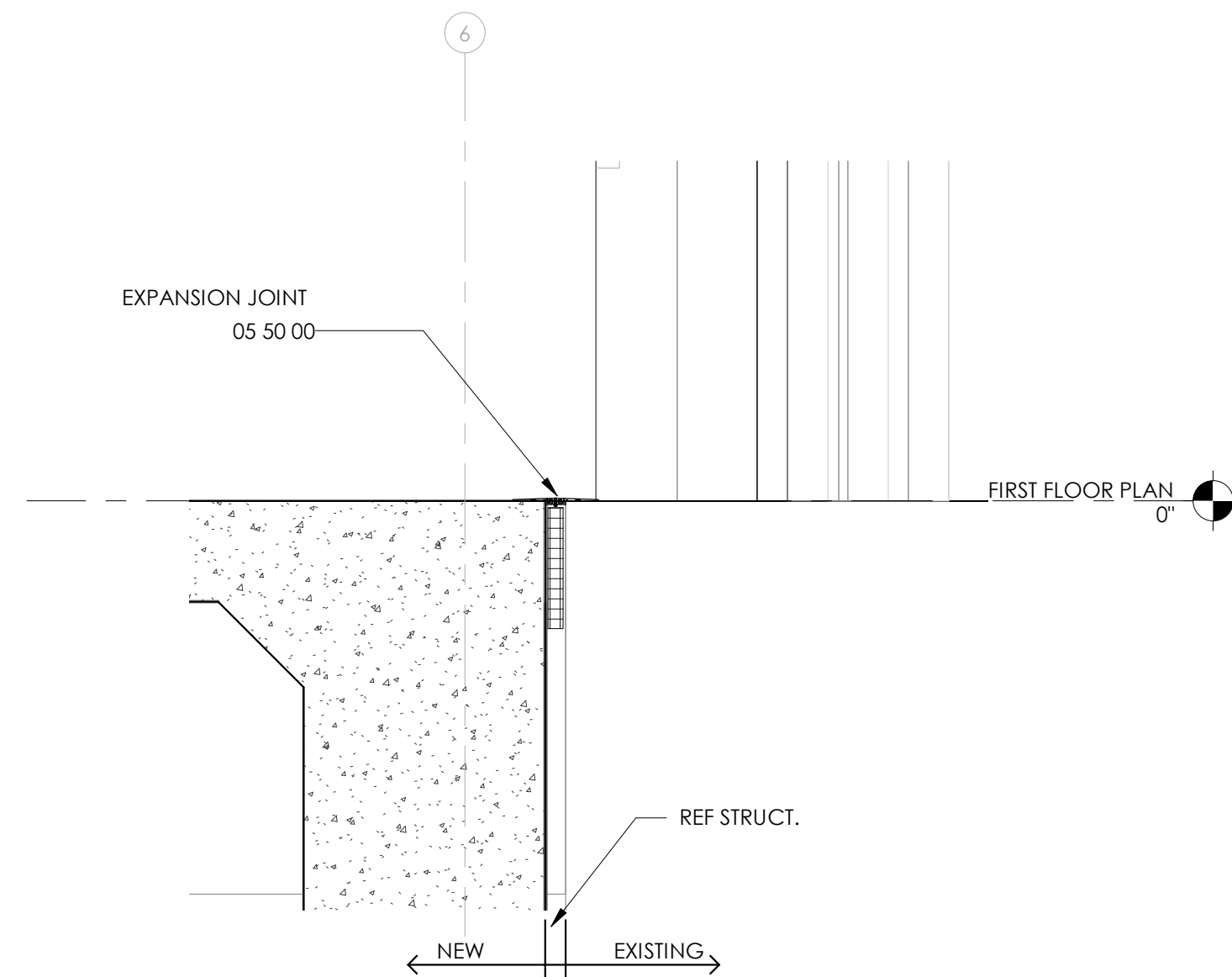
8 COILING DOOR HEAD SECTION DETAIL
A.520 SCALE: 1 1/2" = 1'-0" REF: A.510



9 HOLLOW METAL DOOR THRESHOLD DETAIL
A.520 SCALE: 1 1/2" = 1'-0" REF: A.510



10 METAL PANEL FLOOR SECTION DETAIL
A.520 SCALE: 1 1/2" = 1'-0" REF: A.510



11 FLOOR EXPANSION JOINT DETAIL
A.520 SCALE: 1 1/2" = 1'-0" REF: A.500

GENERAL NOTES

1. REFER TO SHEET G.001 FOR FULL LIST OF REFERENCE NOTES
2. REFER TO STRUCTURAL FOR ADDITIONAL CONCRETE SLAB/FOUNDATION INFORMATION.
3. REFER TO ELECTRICAL FOR ADDITIONAL INFORMATION.
4. REFER TO PLUMBING FOR ADDITIONAL FLOOR DRAIN INFORMATION.

REFERENCE NOTES

- 03 30 00S Cast-In-Place Concrete, Re: Struct
- 04 20 00.A16 8" x 8" x 16" CMU
- 05 12 00 Structural Steel, Re:Struct.
- 05 12 00.B0 C Shape Structural Steel, Re: Struct.
- 05 12 00.L0 Hollow Steel Section, Re: Struct.
- 05 50 00 Metal Fabrications
- 06 10 00.D0 2x4
- 06 10 00.P9 3/4" Plywood Sheathing
- 06 11 00.G1
- 06 16 00.D8 5/8" Plywood
- 07 21 13.A6 2-1/2" Rigid Board Insulation
- 07 21 16.16 Insulating Liner System
- 07 21 16.A0 Sound Batt Insulation
- 07 27 00 Air Barriers
- 07 42 13 Metal Wall Panels
- 07 61 00.A0 Standing Seam Seamed Roofing Panel
- 07 61 00.F0 Roofing Clip
- 07 61 00.F3 Z Closure
- 07 61 00.F6 Fastener
- 07 61 00.G1 Ridge/Hip Cap
- 07 61 00.G3 Eave Flashing
- 07 62 00 Sheet Metal Flashing and Trim
- 07 71 23.N0 Gutter - Profile as Indicated
- 07 71 23.T1 Downspout Strap
- 07 90 00 Joint Protection
- 08 13 13.13 Standard Hollow Metal Doors
- 08 33 23 Overhead Coiling Doors
- 08 71 00.K3 4" Saddle Threshold
- 09 21 16.N0 5/8" Gypsum Board

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AUSTIN, TEXAS 78753
PH: 512.474.6526
FAX: 512.474.6761
204 E. STUBBS
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FAX: 956.386.0613

NEGRETE & KOLAR
ARCHITECTS LLP
WWW.NEKOARCH.COM



Project #1809

CITY OF McALLEN
DEPT OF PUBLIC WORKS
AUTO WAREHOUSE EXPANSION
McAllen, Texas

DRAWN BY: FDP
ISSUED 06/07/2019
DATE:

REVISION / ADDENDA
NO. DATE DESCRIPTION

NOTE:
PAINT ALL EXPOSED STEEL SURFACES

LIST OF ALTERNATES

REFER TO PROJECT MANUAL SECTION 01 20 00

1. ADD NEW ELEVATOR
2. NEW LED LIGHTING AT EXISTING WAREHOUSE
3. REFINISH EXISTING CANOPIES/STRUCTURE

SECTIONS &
DETAILS

A.520

GENERAL NOTES

GENERAL

1. THE CONTRACT STRUCTURAL DRAWINGS AND SPECIFICATIONS REPRESENT THE FINISHED STRUCTURE. UNLESS OTHERWISE INDICATED, THEY DO NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY TO PROTECT THE STRUCTURE, WORKMEN, AND OTHER PERSONS DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO BRACING, SHORING FOR CONSTRUCTION EQUIPMENT, SHORING FOR THE BUILDING, SHORING FOR THE EARTH BANKS, FORMS, SCAFFOLDING, PLANNING, SAFETY NETS, SUPPORT AND BRACING FOR CRANES, GIN POLES, ETC. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK, AND HE SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES. OBSERVATION VISITS TO THE SITE BY THE ARCHITECT OR THE ENGINEER SHALL NOT INCLUDE INSPECTION OF THE ABOVE ITEMS.
2. IT IS SOLELY THE CONTRACTOR'S RESPONSIBILITY TO FOLLOW ALL APPLICABLE SAFETY CODES AND REGULATIONS DURING ALL PHASES OF CONSTRUCTION.
3. EQUIPMENT FRAMING LOADS, OPENINGS AND STRUCTURE IN ANY WAY RELATED TO HVAC, PLUMBING, OR ELECTRICAL REQUIREMENTS ARE SHOWN FOR BIDDING PURPOSES ONLY. EXACT WEIGHTS AND LOCATIONS OF MECHANICAL EQUIPMENT SHALL BE COORDINATED BY CONTRACTOR. IF THE FINAL LOCATION VARIES FROM THAT SHOWN ON THE PLANS, CONTRACTOR TO NOTIFY ARCHITECT AND ENGINEER FOR APPROVAL BEFORE INSTALLATION.
4. SHOULD ANY OF THE DETAILED INSTRUCTIONS SHOWN ON THE PLANS CONFLICT WITH THESE STRUCTURAL NOTES, THE SPECIFICATIONS, OR WITH EACH OTHER, THE STRICTEST PROVISION SHALL GOVERN.
5. THE GENERAL CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS AT THE JOB SITE AND SHALL BE RESPONSIBLE FOR CONDITIONS OF ALL WORK AND MATERIALS.
6. THE CONTRACTOR SHALL REVIEW AND VERIFY ALL DIMENSIONS AND ELEVATIONS. CONTRACTOR SHALL REPORT ANY DISCREPANCIES IN WRITING TO THE ARCHITECT. ANY CONFLICT BETWEEN THE DRAWING AND SPECIFICATIONS OF THE VARIOUS TRADES INVOLVED SHALL BE REPORTED TO THE ARCHITECT AND ENGINEER.
7. DETAILS SHOWN ON DRAWINGS APPLY AT SIMILAR CONDITIONS.
8. ALL WORK SHALL BE DONE IN ACCORDANCE WITH LOCAL STANDARDS AND TO ALL APPLICABLE PROVISIONS OF THE GOVERNING BUILDING CODE.
9. THE ARCHITECT AND ENGINEER SHALL BE NOTIFIED IN WRITING WHEN WORK COMMENCES.
10. CONTRACTOR SUBSTITUTIONS: ANY MATERIALS OR PRODUCTS THAT ARE SUBMITTED FOR APPROVAL THAT ARE DIFFERENT FROM THE MATERIALS OR PRODUCTS SPECIFIED IN THE CONTRACT DOCUMENTS WILL ONLY BE CONSIDERED IF THE FOLLOWING CRITERIA ARE SATISFIED.
 - A) A COST SAVING TO THE OWNER IS DOCUMENTED AND SUBMITTED WITH THE REQUEST.
 - B) THE MATERIAL OR PRODUCT HAS BEEN APPROVED BY THE INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS (ICBO) AND THE ICBO REPORT IS SUBMITTED WITH THE REQUEST.

STRUCTURAL OBSERVATION

1. THE PROFESSIONAL ENGINEER OR HIS/HER AUTHORIZED REPRESENTATIVE SHALL CONDUCT ALL STRUCTURAL OBSERVATIONS. STRUCTURAL OBSERVATIONS SHALL BE FOR THE PURPOSE OF ASCERTAINING GENERAL COMPLIANCE WITH THE CONSTRUCTION DOCUMENTS. HOWEVER, SUCH OBSERVATION VISITS SHALL NOT RELIEVE THE CONTRACTOR FROM HIS OBLIGATIONS AND RESPONSIBILITIES TO THE CONSTRUCTION DOCUMENTS.
2. ITEMS THAT REQUIRE A STRUCTURAL OBSERVATION ARE AS FOLLOWS:
 - A. STEEL REINFORCEMENT IN SLAB OR FOUNDATION
 - B. FILLING OF ROOF STRUCTURE BEFORE METAL PANELS ARE INSTALLED
 - C. EXTERIOR METAL PANEL INSTALLATION
 - D. CMU WALL REINFORCING BEFORE FILLING WITH GROUT
3. NOTIFY ENGINEER 24 HOURS IN ADVANCE WHEN A STRUCTURAL OBSERVATION IS REQUIRED.
4. WORK SHALL NOT CONTINUE AT THESE AREAS UNTIL OBSERVATION AND APPROVAL BY ENGINEER. FAILURE BY THE CONTRACTOR TO PROVIDE PROPER NOTICE FOR AN OBSERVATION VISIT AT THE REQUIRED TIME OR ADDITIONAL WORK PERFORMED WITH OUT OBSERVATION VISIT WILL BE DONE AT CONTRACTOR'S RISK AND MAY BE SUBJECT TO COMPLETE OR PARTIAL REMOVAL TO VERIFY COMPLIANCE OF PREVIOUS WORK.

SHOP DRAWINGS & SUBMITTALS

1. SUBMITTAL THAT WILL BE REQUIRED FOR APPROVAL INCLUDE:
 - A. CONCRETE MIX DESIGN
 - B. CURING COMPOUND FOR CONCRETE
 - C. REINFORCING STEEL
 - D. STRUCTURAL STEEL
 - E. STEEL JOIST
 - F. METAL PANELS
 - G. CMU WALL COMPONENTS
 - H. PRE-ENGINEERED BUILDING (INCLUDING REACTIONS)
2. DEFERRED SUBMITTALS THAT WILL REQUIRE APPROVAL INCLUDE:
 - A. PRE-ENGINEERED BUILDING CALCULATIONS (INCLUDING REACTIONS)
3. DEFERRED SUBMITTALS SHALL BE DESIGNED BY A TEXAS REGISTERED PROFESSIONAL ENGINEER ACCORDING TO THE DESIGN CRITERIA STATED IN THE PLANS AND SPECIFICATIONS THE SUBMITTAL SHALL INCLUDE SIGNED AND SEALED CALCULATIONS.
4. ALLOW (2) WEEKS MINIMUM FOR REVIEW OF SHOP DRAWINGS.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DELAYS CAUSED BY REJECTION OF INADEQUATE OR COMPLETE SHOP DRAWINGS.
6. PRIOR TO ISSUING THE SUBMITTALS TO THE ENGINEER, THE CONTRACTOR SHALL REVIEW THE SHOP DRAWINGS. CONTRACTOR MUST VERIFY ALL DIMENSION WITH ARCHITECTURAL PLANS.
7. REVIEW OF SHOP DRAWINGS BY THE ENGINEER IS FOR GENERAL CONFORMANCE TO THE SUBMITTAL DRAWINGS. APPROVAL OF THE SHOP DRAWINGS BY THE ENGINEER DOES NOT RELIEVE THE CONTRACTOR FOR ANY ERRORS OR OMISSIONS IN DIMENSIONS OR MATERIALS INDICATED ON THE SHOP DRAWINGS.

DESIGN CRITERIA

1. DESIGN LOADS, STRUCTURAL ANALYSIS AND PREPARATION OF STRUCTURAL MEMBERS ARE BASED ON THE FOLLOWING CRITERIA:
2. CODE: IBC 2012
3. VERTICAL LOADS
- A. ROOF DEAD LOAD (PRE-ENGINEERED BUILDING): STRUCTURE SELF WEIGHT
- B. ROOF DEAD LOAD (CANOPIES): STRUCTURE SELF WEIGHT
- C. COLLATERAL LOAD (PRE-ENGINEERED BUILDING): 10 PSF
- D. ROOF LIVE LOAD (REDUCIBLE) : 20 PSF
- E. UPLIFT LOAD : SEE ROOF UPLIFT PLAN
- F. MECHANICAL LOAD:
- THE GENERAL CONTRACTOR SHALL SUBMIT ACTUAL WEIGHTS AND LOCATIONS OF EQUIPMENT TO BE USED ON THE PROJECT TO THE STRUCTURAL ENGINEER FOR VERIFICATION OF LOADS USED IN THE DESIGN AT LEAST TWO WEEKS PRIOR TO FABRICATION AND CONSTRUCTION OF THE SUPPORTING STRUCTURE.
4. LATERAL LOADS
- A. WIND SPEED (V-ULT): 139 MPH
- WIND SPEED (V-ASD) : 108 MPH
- B. EXPOSURE CATEGORY: C
- C. IMPORTANCE FACTOR: 1.0
- D. BUILDING CATEGORY: III
- E. SEISMIC DESIGN CATEGORY: A
- F. SITE CLASS: D
5. GEOTECHNICAL ENGINEERING REPORT:
- PROVIDED BY: TERRACON CONSULTANTS INC.
- PROJECT NUMBER: 88185139
- DATED: 12/11/18
- FOUNDATION DESIGN BASED ON THE FOLLOWING PARAMETERS
- A. EFFECTIVE PI : 19
- B. CLIMATIC RATING (Cw): 15
- C. MINIMUM BEAM DEPTH: 24 IN
- D. MINIMUM BEAM WIDTH: 12 IN
- E. ALLOWABLE BEARING CAPACITY (NET TOTAL LOAD): 2,500 PSF
- F. EXISTING PVR : 1 IN
- G. PVR (SEE EXCAVATION NOTES): 1 INCH

CONCRETE

1. ALL CONCRETE WORK SHALL BE EXECUTED IN ACCORDANCE WITH ACI 318 AND ACI 301 LATEST EDITION.
2. CEMENT SHALL CONFORM TO ASTM C150 TYPE I AGGREGATE SHALL CONFORM TO ASTM C33.
3. CONCRETE SHALL HAVE A MINIMUM 28 DAYS COMPRESSIVE STRENGTH AS FOLLOWS:

MEMBER TYPE	STRENGTH	SUMP	MAX AGG.
FOUNDATION	3000 PSI	4'-6"	1.5 IN.
AND SLAB			
C.I.P. BEAMS AND LINTELS	4000 PSI	4'-7"	.75 IN.
4. INSTALL 10 MIL VAPOR RETARDER UNDER SLABS ON GRADE AND ALONG SIDE OF TRENCHES IN ACCORDANCE WITH ASTM E1643. LAP JOINTS MINIMUM OF 12 INCHES.
5. PLACE CONCRETE CONTINUOUSLY BETWEEN PRE-DETERMINED EXPANSION AND CONSTRUCTION JOINTS.
6. ALL CONSTRUCTION JOINT LOCATIONS TO BE APPROVED BY ARCHITECT AND STRUCTURAL ENGINEER.
7. HORIZONTAL CONSTRUCTION JOINTS SHALL NOT BE PERMITTED.
8. CURE CONCRETE IN ACCORDANCE WITH ACI 308.1
9. REFER TO ARCHITECTURAL AND MECHANICAL PLANS FOR LOCATIONS OF ALL DEPRESSIONS, OPENINGS, ACCESSORIES, ETC.
10. CONDUIT AND PLUMBING LINES SHALL BE PLACED BELOW SLAB REINFORCING AND SHALL BE NO BIGGER THAN 1 INCH.
11. FLYASH MAY BE USED TO REPLACE A PORTION OF THE PORTLAND CEMENT. THE RATIO OF FLYASH TO THE TOTAL OF THE FLYASH AND CEMENT IN A MIX SHALL NOT EXCEED 20%. FLYASH SHALL CONFORM TO ASTM C618, TYPE C OR F.
12. ALL FLOORS SHALL BE CONSTRUCTED WITH A MINIMUM FLATNESS FF = 35 AND A MINIMUM LEVELNESS OF FL = 25
13. CONTRACTION JOINTS TO BE INSTALLED WITHIN 12 HOURS OF POURING FOUNDATION.
14. TESTING OF CONCRETE SHALL BE DONE AS FOLLOWS:
 - 1) SETS SHALL CONSIST OF 3 CYLINDERS
ONE TESTED AT 7 DAYS
TWO TESTED AT 28 DAYS
 - 2) ONE SET SHALL BE TAKEN FOR EACH 150 CY AND FOR EVERY 5000 SF OF SURFACE AREA AND AT LEAST ONCE PER DAY OF POURING
 - 3) A MINIMUM OF 3 SETS SHALL BE TAKEN FOR EACH CLASS OF CONCRETE

15. NO WATER SHALL BE ADDED TO THE CONCRETE AT THE JOBSITE. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE WITH THE CONCRETE SUPPLIER TO ENSURE A PUMPABLE AND WORKABLE MIX WITHOUT THE ADDITION OF WATER AT THE JOBSITE. THE USE OF PLASTICIZERS, RETARDANTS AND OTHER ADDITIVES SHALL BE AT THE OPTION OF THE CONTRACTOR SUBJECT TO THE APPROVAL OF THE STRUCTURAL ENGINEER. FOLLOW THE RECOMMENDATIONS OF THE MANUFACTURER FOR THE PROPER USE OF ADDITIVES. THE USE OF CALCIUM CHLORIDE OR OTHER CHLORIDE BEARING SALTS SHALL NOT BE PERMITTED.
16. PLACE CONCRETE IN A MANNER SO AS TO PREVENT SEGREGATION OF THE MIX. DELAY FLOATING AND TROWELING OPERATIONS UNTIL CONCRETE HAS LOST SURFACE WATER SHEEN OR ALL FREE WATER. DO NOT SPRINKLE FINE CEMENT ON THE SLAB SURFACE. FINISHING OF SLAB SURFACES SHALL COMPLY WITH THE RECOMMENDATIONS OF ACI 302.1 AND 304.
17. UNLESS SPECIFIED, CONCRETE MUST REACH THE FOLLOWING PERCENTAGES OF ITS 28-DAY COMPRESSIVE STRENGTH (f_c) BEFORE FORMS MAY BE REMOVED.

WALL, COLUMNS, & BEAM SIDES.....	40%
JOIST PANS & BEAM BOTTOMS (IF RESHORED).....	70%
SHORING FOR FLOOR SYSTEMS (IF NOT RESHORED).....	85%
18. NO CONCRETE SHALL BE PLACED OUTSIDE OF THESE SPECIFICATIONS WITHOUT THE OWNER'S PRIOR APPROVAL. ANY ITEMS NOT IN COMPLIANCE WITH THE OUTLINED SPECIFICATION SHALL BE REPORTED TO THE OWNER AND STRUCTURAL ENGINEER WITHIN 24 HOURS.
19. CONSTRUCTION VEHICLE LOADS SHALL NOT BE PERMITTED ON ELEVATED SLABS AT ANY TIME.
20. ALL RETAINING WALLS TO BE SHORED UNTIL UPPER SLAB IS IN PLACE AND HAS REACHED 70% OF ITS DESIGN STRENGTH OR THE RETAINING WALL HAS REACHED 100% OF ITS DESIGN STRENGTH. PROVIDE GRANULAR BACKFILL AND PERFORATED DRAIN PIPE CONNECTED TO SITE DRAINAGE, RE: CIVIL PLAN.

STRUCTURAL STEEL

1. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED, AND ERECTED IN ACCORDANCE TO AISC SPECIFICATIONS.
2. MATERIALS USED SHALL BE AS FOLLOWS=
 - A. STRUCTURAL W-SHAPES
 - ASTM A992 GRADE 50
 - B. STRUCTURAL M-SHAPES AND S-SHAPES
 - ASTM A36
 - C. STRUCTURAL T-SHAPES
 - CUT FROM W-SHAPES
 - D. CHANNELS AND ANGLES
 - ASTM A36
 - E. ROUND HOLLOW STRUCTURAL SECTIONS
 - ASTM A500 GRADE B
 - F. SQUARE AND RECTANGULAR HOLLOW STRUCTURAL SECTIONS
 - ASTM A500 GRADE B
 - G. STRUCTURAL PLATES
 - ASTM A36
 - H. STRUCTURAL BARS
 - ASTM A36
 - I. HIGH STRENGTH BOLTS
 - ASTM A325
 - J. ELECTRODES
 - SERIES E70
3. ALL WELDING SHALL BE DONE BY CERTIFIED WELDERS IN ACCORDANCE WITH THE LATEST EDITION OF THE AMERICAN WELDING SOCIETY SPECIFICATIONS.
4. CONNECTIONS NOT DETAILED AND/OR SCHEDULED ON STRUCTURAL DRAWINGS SHALL BE DETAILED BY FABRICATOR AND MARKED FOR ENGINEERS APPROVAL. CONNECTIONS TO BE DESIGNED TO AISC SPECIFICATIONS AND SHALL BE CAPABLE OF SUPPORTING 55% OF THE MAXIMUM UNIFORM LOAD CAPACITY FOR THE SPAN SPECIFIED, SHOWN IN THE TABLES OF UNIFORM CONSTANTS OF THE AISC MANUAL OF STEEL CONSTRUCTION.
5. REFER TO ARCHITECTURAL PLANS FOR ANY MISCELLANEOUS STEEL. MISCELLANEOUS STEEL AND CONNECTIONS SHALL BE DESIGNED BY STEEL FABRICATOR.
6. HOT DIP GALVANIZE, IN ACCORDANCE WITH ASTM A123 AND ASTM A153, STRUCTURAL STEEL AND FASTENERS PERMANENTLY EXPOSED TO THE WEATHER.
7. STEEL SUPPORTING OR CONNECTED TO HVAC AND OTHER EQUIPMENT AS SHOWN ON THE DRAWINGS IS SHOWN FOR HIDING PURPOSES ONLY CONTRACTOR SHALL COORDINATE EXACT LOCATION AND SIZE BEFORE COMMENCING WORK.
8. STRUCTURAL STEEL SHALL BE PAINTED WITH ONE COAT OF RUST INHIBITIVE PAINT.
9. STRUCTURAL DRAWINGS SHALL NOT BE REPRODUCED IN WHOLE OR IN PART FOR SHOP DRAWING SUBMITTALS.
10. PROVIDE 4 TONS OF RED IRON ALLOWANCE TO BE USED AS DIRECTED BY STRUCTURAL ENGINEER. INCLUDE LABOR COSTS IN THE ALLOWANCE. ANY UNUSED ALLOWANCE SHALL BE CREDITED BACK TO OWNER AT A COST OF \$4,000 PER TON.
11. ALL WELDED CONNECTION SHALL BE MADE WITH A 1/4" FILLET WELD U.N.O.
12. PROVIDE 1/2" GAP AT ALL PENETRATIONS THROUGH CMU WALL AND INFILL WITH ELASTOMERIC MATERIAL.
13. STEEL FABRICATOR SHALL BE CERTIFIED BY ONE OF THE FOLLOWING: AISC/ IBC/ IAS-ICC

MASONRY

- A. MATERIALS:
- A. CONCRETE BLOCK: MEDIUM WEIGHT ASTM C90 (HOLLOW) ASTM C145 (SOLID) MINIMUM COMPRESSIVE STRENGTH: 1900 PSI
 - B. MORTAR: ASTM C270 TYPE S.
 - C. GROUT: MINIMUM COMPRESSIVE STRENGTH: 2000 PSI
 - D. NET AREA COMPRESSIVE STRENGTH: 1500 PSI TO BE TESTED IN ACCORDANCE TO ASTM C1314 STANDARDS.
 - E. JOINT REINFORCING: MILL GALVANIZED FINISH, 9 GAGE MINIMUM SIZE WIRES AND CROSS WIRES (DUR-O-WALL, A HOHMANN + BARNARD COMPANY).
 - F. BAR REINFORCING: ASTM A615, GRADE 60 (UNLESS NOTED OTHERWISE).
 - G. TYPICAL CMU WALL REINFORCING SHALL BE #5 (V) AT 48" O.C. AND #5 (H) AT 8'-0" O.C. U.N.O. ON DRAWINGS.
2. REINFORCED MASONRY, WHERE VERTICAL BARS ARE TO BE GROUTED INTO CORES, THE FOLLOWING REQUIREMENTS APPLY:
- A. PROVIDE DOWELING FROM WALL, SAME SIZE AND SPACING AS WALL BARS. LAP 48 BAR DIAMETERS MINIMUM WITH WALL BAR.
 - B. PROVIDE A CONTINUOUS VERTICAL CAVITY, AT LEAST 2' x 3' IN SIZE, FREE OF MORTAR DROPPINGS.
 - C. PROVIDE REBAR ALIGNMENT DEVICES AT A MAXIMUM SPACING OF 96 BAR DIAMETERS MINIMUM OF PER BAR.
 - D. ALL SPICES IN VERTICAL BARS, PROVIDE MECHANICAL COUPLERS OR 48 BAR DIAMETER LAP.
 - E. ALL REINFORCEMENT MUST BE INSTALLED AND SECURELY ANCHORED IN PLACE PRIOR TO PLACEMENT OF GROUT.
 - F. MAXIMUM HEIGHT OF GROUT LIFT + 4'-0". UNLESS HIGH LIFT GROUTING PROCEDURES ARE EMPLOYED IN ACCORDANCE WITH ASI 530-99
3. MISCELLANEOUS:
- A. FILL CORE SOLID AROUND ANCHOR BOLTS.
 - B. PROVIDE SOLIDLY FILLED HOLLOW BLOCKS AT ALL EMBED ANCHOR LOCATIONS.
 - C. SET WELD PLATES IN BOND BEAMS AFTER THE GROUT IS PLACED, BUT WHILE IT IS STILL PLASTIC.
 - D. HOLLOW MASONRY UNITS TO BE LAID WITH FULL MORTAR COVERAGE ON HORIZONTAL AND VERTICAL FACE SHELLS. WEBS SHALL ALSO BE BEDDED IN ALL COURSES OF PIERS, COLUMNS, AND PILASTERS, AND IN THE STARTING COURSE ON FOOTING, AND WHEN ADJACENT TO CELLS OR CAVITIES TO BE REINFORCED OR FILLED WITH CONCRETE OR GROUT. SOLID UNITS TO BE LAID WITH FULL HEAD AND BED JOINTS.
 - E. PROVIDE JOINT REINFORCING AT 16 INCHES, EXCEPT AS NOTED.
 - F. LAP JOINT REINFORCING 6 INCHES FOR STANDARD, 15 INCHES FOR HEAVY WEIGHT.
 - G. VERTICAL CONTROL JOINTS SHALL BE PROVIDED FULL HEIGHT OF MASONRY WALLS AS LOCATED ON THE DRAWINGS. THE JOINT SHALL BE PROVIDED AS A CONTINUOUS HEAD JOINT WITH MORTAR RACKED BACK 3/4" AT BOTH FACES AND 50% OF THE HORIZONTAL JOINT REINFORCING CUT AT THE JOINT. AFTER THE MORTAR IS SET, THE JOINT SHALL BE CAULKED.
 - H. FILL ALL VOIDS AND CELLS WITHIN 12" EITHER SIDE OF CENTERLINE OF BEAM AND/OR COLUMN BEARING LOCATIONS WITH A #4 REINFORCING BAR AND GROUT U.N.O.
 - I. ALL CMU WALLS MUST HAVE SPECIAL INSPECTION PER IBC CODE 2102 SECTION 1705.4 "MASONRY CONSTRUCTION" ON CHAPTER 17 "STRUCTURAL TEST & SPECIAL INSPECTION". THE CONTRACTOR MUST PROVIDE REPORTS OF THESE "SPECIAL INSPECTIONS".
 - J. BARS SCHEDULED "CONTINUOUS" SHALL BE SPLICED AS FOLLOWS:

REINFORCING BAR SIZE	MIN. LAP SPICE LENGTH
#5	30"
#6	36"
#7	42"
#8	48"
#9	54"
#10	MECHANICAL CONNECTOR
#11	

4. STABILITY AND BRACING:
ALL MASONRY WALLS SHOWN ON THE CONTRACT DRAWINGS HAVE BEEN DESIGNED TO RESIST THE REQUIRED CODE VERTICAL AND LATERAL FORCES APPLIED TO THEM IN THEIR FINAL CONSTRUCTED POSITION ONLY ASSUMING FULL BRACING AT TOP, BOTTOM, AND / OR SIDES AS INDICATED. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT CONSTRUCTION RESIST ANY ERECTION VERTICAL OR LATERAL LOADS THAT COULD BE IMPOSED ON THE WALLS PRIOR TO CONSTRUCTION COMPLETION.
5. TESTING:
 - A. TESTING FREQUENCY: ONE SET OF SPECIFIED TESTS FOR EVERY 5,000 SF OF COMPLETED WALL AREA.
 - B. TESTING OF MORTAR: IN ACCORDANCE WITH ASTM C780 FOR AGGREGATE RATIO AND WATER CONTENT, AIR CONTENT, CONSISTENCY, AND COMPREHENSIVE STRENGTH.
 - C. TESTING OF GROUT MIX: IN ACCORDANCE WITH ASTM C1019 FOR COMPREHENSIVE STRENGTH, AND IN ACCORDANCE WITH ASTM C143/C143M FOR SLUMP.
 - D. TEST COMPREHENSIVE STRENGTH OF MORTAR AND MASONRY TO ASTM C1314: TEST IN ACCORDANCE WITH MASONRY UNIT SECTIONS SPECIFIED.
6. GENERAL CONTRACTOR SHALL HOLD A PRE-CONSTRUCTION MEETING WITH STRUCTURAL ENGINEER AND MASONRY CONTRACTOR BEFORE MASONRY WORK COMMENCES.

STEEL REINFORCING

1. ALL REINFORCEMENT SHALL BE NEW BILLET STEEL CONFORMING TO ASTM A-615 GRADE 60.
2. REINFORCING STEEL SHALL BE DESIGNED, DETAILED, FABRICATED AND PLACED IN ACCORDANCE WITH THE LATEST ACI DETAILING MANUAL (SP-66) AND CSRI MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE, (ACI #315) LATEST EDITIONS.
3. BARS SCHEDULED OR DETAILED "CONT" SHALL BE SPLICED ONLY WHEN UNAVOIDABLE AT POINTS OF MINIMUM STRESS AND WITH A MINIMUM LAP AS FOLLOWS:
 - A. HORIZONTAL SPLICES w/ MORE THAN 12" OF FRESH CONCRETE CAST BELOW LAPS.
 - #6 BARS AND SMALLER - 57 BAR DIAMETERS
 - #7 BARS AND BIGGER - 72 BAR DIAMETERS
 - B. OTHER BARS
 - #6 BARS AND SMALLER - 44 BAR DIAMETERS
 - #7 BARS AND BIGGER - 55 BAR DIAMETERS
 - C. ALL SPLICES TO BE STAGGERED A MINIMUM OF 4'-0". TOP BAR AND BOTTOM BAR SPLICES TO BE LOCATED AT MID-SPAN AND WITHIN 1/3 SPAN RESPECTIVELY.
4. CORNER REINFORCING BARS SHALL BE USED AT ALL CORNERS AND INTERSECTIONS.
5. EXTEND THE SLAB REINFORCING STEEL PERPENDICULAR TO EXTERIOR GRADE BEAM TO THE TOP OUT SIDE REINFORCING BAR OF BEAM.
6. SPACE REINFORCING BARS WITH MINIMUM CLEAR SPACING IN ACCORDANCE WITH ACI 318 OF ONE BAR DIAMETER, BUT NOT LESS THAN 1 INCH. FOR COMPRESSION MEMBERS, SPACE AT A MINIMUM OF 1.5 INCHES OR 1.5 BAR DIAMETERS, WHICHEVER IS GREATER.
7. WHERE REINFORCING BARS ARE PLACED IN MULTIPLE LAYERS, PLACE UPPER BARS DIRECTLY ABOVE LOWER BARS.
8. MAINTAIN CONCRETE COVER AROUND REINFORCEMENT IN ACCORDANCE WITH ACI 318 AND AS FOLLOWS:
 - A. FOOTING AND CONCRETE CAST AGAINST EARTH - 3 INCHES
 - B. EXPOSED TO EARTH OR WEATHER
 - #6 BARS AND BIGGER - 2 INCHES
 - #5 BARS AND SMALLER - 1.5 INCHES
 - C. BEAMS AND COLUMNS - 1.5 INCHES
 - D. SLABS AND WALLS - 1 INCH
9. REPAIR ANY DAMAGE TO VAPOR RETARDER PER MANUFACTURER SPECIFICATIONS.
10. ADDITIONAL REINFORCING TO BE PROVIDED ON SITE FOR USE AS DIRECTED BY STRUCTURAL ENGINEER.
 - #4 BARS - 100 FT.
 - #5 BARS - 100 FT.
 - #6 BARS - 100 FT.

PRE-ENGINEERED METAL BUILDING AND COMPONENTS

1. REFER TO SCHEMATIC ROOF FRAMING PLAN AND DESIGN CRITERIA FOR DESIGN LOAD REQUIREMENTS AND SPECIFICATIONS FOR THE PRE-ENGINEERED METAL BUILDING.
2. PRE-ENGINEERED METAL BUILDING MANUFACTURER SHALL SUBMIT DESIGN CERTIFICATION SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF TEXAS FOR THE STRUCTURAL FRAMING AND COVERING PANELS OF THE BUILDING SYSTEM. CERTIFICATION AND DESIGN SHALL MEET REQUIREMENTS OF THE INTERNATIONAL BUILDING CODE (IBC) AND ASCE 7.
3. PRE-ENGINEERED METAL BUILDING MANUFACTURER CERTIFICATION SHALL BE SUBMITTED WITH SEALED SHOP DRAWINGS WHEN SUBMITTED FOR REVIEW.
4. SHOP DRAWINGS AND CALCULATIONS INCLUDING BUILDING REACTIONS, SHALL BE PREPARED AND REVIEWED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF TEXAS. SEAL SHOP DRAWINGS AND CALCULATIONS SHALL BE SUBMITTED FOR REVIEW BY THE DESIGN TEAM.
5. ALL COMPONENTS SHALL BE DESIGNED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST SPECIFICATIONS AND STANDARDS OF THE AISC. THIS WORK SHALL INCLUDE ALL MEMBERS AND BRACES NECESSARY TO BRACE MASONRY WALLS. LIGHT GAGE STEEL MEMBERS SHALL COMPLY WITH THE LATEST ADDITION OF THE AISI.
6. PURLINS AND EAVE STRUTS SHALL HAVE A MINIMUM YIELD STRESS OF 55 KSI AND SHALL BE PAINTED WITH ONE COAT OF RED OXIDE OR APPROVED SHOP COAT.
7. PURLIN SPACING SHOWN IN STRUCTURAL DRAWINGS ARE FOR SCHEMATIC PURPOSES ONLY. PURLIN SPACING TO BE DETERMINED BY METAL BUILDING MANUFACTURER. PURLINS SHALL HAVE A MAXIMUM TOTAL LOAD DEFLECTION OF L/180.
8. SAG STRAPS SHALL BE LOCATED AS SHOWN ON PLANS AND SHALL BE FABRICATED WITH A MINIMUM YIELD STRENGTH OF 50 KSI.
9. STANDING SEAM METAL ROOF SHALL NOT BE CONSIDERED TO PROVIDE LATERAL BRACING FOR PURLINS. BRIDGING SHALL BE DESIGNED AND SUPPLIED BY THE METAL BUILDING MANUFACTURER TO RESIST BOTH GRAVITY AND UPLIFT LOADS.
10. CROSS BRACING SHALL BE DESIGNED AND SUPPLIED BY THE METAL BUILDING MANUFACTURER TO PROVIDE AN ADEQUATE HORIZONTAL ROOF DIAPHRAGM FOR THE STRUCTURE.
11. PROVIDE PINNED BASE CONNECTION FROM COLUMN TO FOUNDATION.
12. ALL ANCHOR BOLTS SIZES, LENGTH, AND EMBEDMENT SHALL BE DESIGNED BY THE METAL BUILDING MANUFACTURER AND SUPPLIED BY THE CONTRACTOR. ANCHOR BOLT EMBEDMENT DEPTHS SHALL BE DESIGNED TO RESIST CONCRETE CONICAL SHEAR FAILURE.
13. THIS FOUNDATION HAS BEEN DESIGNED USING ASSUMED REACTIONS FROM THE PRE ENGINEERED METAL BUILDING COMPONENTS AND IS FOR BID PURPOSES ONLY. THE CONTRACTOR SHALL SUBMIT BASE CONNECTION DETAILS (SIZE AND THICKNESS OF BASE PLATE AND DIAMETER AND LENGTH OF ANCHOR BOLTS) AND REACTIONS SO THE DESIGN ASSUMPTIONS CAN BE VERIFIED.
14. ANY ADDITIONAL COST OF FOUNDATION WORK REQUIRED BY REVISIONS OF THE FOUNDATION DESIGN AFTER PRE-ENGINEERED METAL BUILDING REACTIONS ARE SUBMITTED SHALL NOT BE INCURRED BY STRUCTURAL ENGINEER.
15. DRIFT CRITERIA FOR RIGID FRAMES AND METAL GIRTS SHALL HAVE A MAXIMUM DEFLECTION OF H/240 FOR MASONRY FINISHES AND A H/120 FOR METAL SIDING.

CONTRACTOR NOTE

THE STRUCTURAL SYSTEM FOR THIS PROJECT SHALL NOT BE CONSTRUCTED BY USING THE STRUCTURAL DRAWINGS ALONE. THESE DRAWINGS WERE DEVELOPED FROM DATA DERIVED PRIMARILY FROM THE ARCHITECTURAL DRAWINGS AND SECONDARILY FROM MEP, CIVIL AND OTHER DISCIPLINES' DOCUMENTS. IT IS INTENDED THAT CONSTRUCTION PROCEED BY UTILIZING ALL OF THE INFORMATION CONTAINED IN THE ENTIRE SET OF CONSTRUCTION DOCUMENTS TAKEN AS A WHOLE; FAILURE TO DO SO WILL RESULT IN ERRORS WHICH SHALL BE CORRECTED AT THE CONTRACTOR'S EXPENSE.

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400 Nolana, Suite H2

McAllen, Texas 78504

PH: (956) 687-9421 FAX: (956) 687-3211

www.chaninengineering.com

TBPE FIRM REG. NUMBER F-9369

11720 NORTH IH35
AUSTIN TEXAS 78753
PH. 512.474.6526
FAX. 512.474.6761

204 E. STUBBS
STREET
EDINBURG, TX
78539
PH. 956.386.0611
FAX 956.386.0613

NEGRETE & KOLAR
ARCHITECTS^{LLP}
WWW.NEKOARCH.COM



06/7/19

Project # 18237

CITY OF MCALLEN
DEPT OF PUBLIC WORKS
AUTO WAREHOUSE EXPANSION
McAllen, Texas

DRAWN BY: E.F.S.

ISSUED 06/7/19

DATE:

REVISION / ADDENDA

NO.	DATE	DESCRIPTION
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GENERAL NOTES

S.100

GENERAL NOTES

CHANIN
ENGINEERING, LLC

400 Nolana, Suite H2
McAllen, Texas 78504
PH: (956) 687-9421 FAX: (956) 687-3211
www.chaninengineering.com
TBPE FIRM REG. NUMBER F-9369

11720 NORTH IH35
AUSTIN, TEXAS 78753
PH: 512.474.6526
FAX: 512.474.6761
204 E. STUBBS
STREET
EDINBURG, TX
78942
PH: 956.386.0611
FAX: 956.386.0613

NEGRETE & KOLAR
ARCHITECTS, LLP
WWW.NEKOARCH.COM



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CITY OF MCALEN
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ISSUED 06/7/19
DATE:
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NO. DATE DESCRIPTION

GENERAL NOTES

S.101

COLD ROLLED STEEL SPECIFICATIONS (SSMA)

- ALL STUDS AND/OR JOISTS AND ACCESSORIES SHALL BE OF THE TYPE, SIZE, GAUGE AND SPACING SHOWN ON THE DRAWINGS.
- ALL STRUCTURAL MEMBERS AND CONNECTIONS SHALL BE IN ACCORDANCE WITH AMERICAN IRON AND STEEL INSTITUTE (AISI) "SPECIFICATION FOR THE DESIGN OF COLD FORMED STEEL STRUCTURAL MEMBERS", LATEST EDITION.
- ALL STUDS, RUNNERS, JOIST AND TRUSSES SHALL BE FORMED FROM GALVANIZED STEEL, CORRESPONDING TO THE REQUIREMENTS OF ASTM A446, WITH A MINIMUM YIELD STRENGTH OF 50 KSI FOR .097, .068, .054 THICK MEMBERS AND 33 KSI FOR.043 AND .033 THICK MEMBERS AND FLAT STRAP BRACING.
- PRIOR TO FABRICATION THE CONTRACTOR SHALL SUBMIT ERECTION DRAWINGS TO THE STRUCTURAL ENGINEER FOR APPROVAL.
- ALL FRAMING COMPONENTS SHALL BE CUT SQUARELY FOR ATTACHMENT TO PERPENDICULAR MEMBERS OR, AS REQUIRED, FOR AN ANGULAR FIT AGAINST ABUTTING MEMBERS.
- FASTENING OF COMPONENTS SHALL BE WITH SELF-DRILLING SCREWS OR WELDS. SCREWS OR WELDS SHALL BE OF SUFFICIENT SIZE TO INSURE THE STRENGTH OF THE CONNECTION. WIRE TYING OF COMPONENTS SHALL NOT BE PERMITTED. ALL WELDS SHALL BE TOUCHED-UP WITH A ZINC-RICH PAINT.
- RUNNERS SHALL BE SECURELY ANCHORED TO THE SUPPORTING STRUCTURE. PROPOSED CONNECTION TO BE SUBMITTED FOR APPROVAL.
- SOLID BLOCKING, OF FIELD-CUT TRACK OR JOIST SECTION, SHALL BE PROVIDED, WELDED OR SCREW-ATTACHED BETWEEN OUTER JOIST, OVER ALL INTERIOR SUPPORTS AND ADJACENT TO OPENINGS AT 10'-0" O.C. MAX. COLD-ROLLED CHANNELS OR STRAP BRACING OF 1 1/2" x 33 MIL. (0.033") CORROSION-RESISTANT STEEL SHALL BE SCREW-ATTACHED TO BOTTOM JOIST FLANGE BETWEEN SOLID BLOCKING. REFERENCE MANUFACTURER INSTALLATION INSTRUCTIONS.

STRUCTURAL TESTS AND SPECIAL INSPECTION

- THE OWNER SHALL EMPLOY A SPECIAL INSPECTOR TO PROVIDE INSPECTIONS DURING CONSTRUCTION ON THE TYPES OF WORK LISTED IN THIS SECTION.
- THE FOLLOWING TERMS AND PHRASES SHALL HAVE THE MEANINGS SHOWN BELOW AS IT PERTAINS TO THIS SECTION.
 - APPROVED AGENCY - AN ESTABLISHED AND RECOGNIZED AGENCY REGULARLY ENGAGED IN CONDUCTING AND FURNISHING SPECIAL INSPECTION SERVICES.
 - APPROVED FABRICATOR - AN ESTABLISHED AND QUALIFIED FIRM APPROVED BY BUILDING OFFICIAL. SPECIAL INSPECTIONS ARE NOT REQUIRED WHEN WORK IS PERFORMED ON THE PREMISES OF AN APPROVED FABRICATOR.
 - SPECIAL INSPECTION, CONTINUOUS - THE FULL TIME OBSERVATION OF WORK REQUIRING SPECIAL INSPECTION.
 - SPECIAL INSPECTION, PERIODIC - THE PART TIME OR INTERMITTENT OBSERVATION OF WORK REQUIRING SPECIAL INSPECTION.
- SPECIAL INSPECTORS SHALL KEEP RECORDS OF ALL INSPECTIONS AND SHALL FURNISH REPORTS TO THE BUILDING OFFICIAL AND TO THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE. DISCREPANCIES SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE CONTRACTOR FOR CORRECTION. IF THE DISCREPANCIES ARE NOT CORRECTED THEY SHALL BE BROUGHT TO THE ATTENTION OF THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE.
- SPECIAL INSPECTION FOR STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH THE QUALITY ASSURANCE INSPECTION REQUIREMENTS OF AISC 360.
- SPECIAL INSPECTION FOR MASONRY CONSTRUCTION SHALL BE INSPECTED AND VERIFIED IN ACCORDANCE WITH TMS 402/ACI 530/ASCE 5 AND TMS 602/ACI 530.1/ASCE 6 QUALITY ASSURANCE PROGRAM REQUIREMENTS.
- THE FOLLOWING ITEMS REQUIRE SPECIAL INSPECTION.

TABLE 1705.3 REQUIRED VERIFICATION AND INSPECTION OF CONCRETE CONSTRUCTION				
VERIFICATION AND INSPECTION	CONTINUOUS	PERIODIC	REFERENCE D STANDARD	IBC REFERENCE
1. INSPECTION OF REINFORCING STEEL, INCLUDING PRESTRESSING TENDONS, AND PLACEMENT.	—	X	ACI 318: 3.5, 7.1-7.7	1910.4
2. INSPECTION OF REINFORCING STEEL WELDING IN ACCORDANCE WITH TABLE 1705.2.2, ITEM 2b.	—	—	AWS D1.4 ACI 318: 3.5.2	—
3. INSPECTION OF ANCHORS CAST IN CONCRETE WHERE ALLOWABLE LOADS HAVE BEEN INCREASED OR WHERE STRENGTH DESIGN IS USED.	—	X	ACI 318: 8.1.3, 21.2.8	1908.5 1909.1
4. INSPECTION OF ANCHORS POST-INSTALLED IN HARDENED CONCRETE MEMBERS.	—	X	ACI 318: 3.86, 8.1.3, 21.2.8	1909.1
4. VERIFYING USE OF REQUIRED DESIGN MIX.	—	X	ACI 318: Ch. 4, 5.2-5.4	1904.2, 1910.2, 1910.3
6. AT THE TIME FRESH CONCRETE IS SAMPLED TO FABRICATE SPECIMENS FOR STRENGTH TESTS, PERFORM SLUMP AND AIR CONTENT TESTS, AND DETERMINE THE TEMPERATURE OF THE CONCRETE.	X	—	ASTM C 172 ASTM C 31 ACI 318: 5.6, 5.8	1910.10
7. INSPECTION OF CONCRETE AND SHOTCRETE PLACEMENT FOR PROPER APPLICATION TECHNIQUES.	X	—	ACI 318: 5.9, 5.10	1910.6, 1910.7, 1910.8
8. INSPECTION FOR MAINTENANCE OF SPECIFIED CURING TEMPERATURE AND TECHNIQUES.	—	X	ACI 318: 5.11-5.13	1910.9
9. INSPECTION OF PRESTRESSED CONCRETE: a. APPLICATION OF PRESTRESSING FORCES. b. GROUTING OF BONDED PRESTRESSING TENDONS IN THE SEISMIC-FORCE-RESISTING SYSTEM.	X X	—	ACI 318: 18.20 ACI 318: 18.18.4	—
10. ERECTION OF PRECAST CONCRETE MEMBERS.	—	X	ACI 318: Ch.16	—
11. VERIFICATION OF IN-SITU CONCRETE STRENGTH. PRIOR TO STRESSING OF TENDONS IN POST-TENSIONED CONCRETE AND PRIOR TO REMOVAL OF SHORES AND FORMS FROM BEAMS AND STRUCTURAL SLABS.	—	X	ACI 318: 6.2	—
12. INSPECT FORMWORK FOR SHAPE, LOCATION AND DIMENSIONS OF THE CONCRETE MEMBER BEING FORMED.	—	X	ACI 318: 6.1.1	—

LEVEL 1 REQUIRED VERIFICATION AND INSPECTION OF MASONRY CONSTRUCTION					
INSPECTION TASK	FREQUENCY OF INSPECTION		REFERENCE FOR CRITERIA		
	CONTINUOUS DURING TASK LISTED	PERIODICALLY DURING TASK LISTED	IBC SECTION	ACI 530/ ASCE 5/ TMS 402	ACI 530.1/ ASCE 6/ TMS 602
1. AS MASONRY CONSTRUCTION BEGINS, THE FOLLOWING SHALL BE VERIFIED TO ENSURE COMPLIANCE:					
a. PROPORTIONS OF SITE-PREPARED MORTAR.	—	X	—	—	Art. 2.6A
b. CONSTRUCTION OF MORTAR JOINTS.	—	X	—	—	Art. 3.3B
c. LOCATION OF REINFORCEMENT, CONNECTORS, PRE-STRESSING TENDONS AND ANCHORAGES.	—	X	—	—	Art. 3.4, 3.6A
d. PRE-STRESSING TECHNIQUE.	—	X	—	—	Art. 3.6B
e. GRADE AND SIZE OF PRE-STRESSING TENDONS AND ANCHORAGES.	—	X	—	—	Art. 2.4B, 2.4H
2. THE INSPECTION PROGRAM SHALL VERIFY:					
a. SIZE AND LOCATION OF STRUCTURAL ELEMENTS.	—	X	—	—	Art. 3.3G
b. TYPE, SIZE AND LOCATION OF ANCHORS, INCLUDING OTHER DETAILS OF ANCHORAGE OF MASONRY TO STRUCTURAL MEMBERS, FRAMES OR OTHER CONSTRUCTION.	—	X	—	Sec. 1.2.2(e), 2.1.4, 3.1.6	—
c. SPECIFIED SIZE, GRADE AND TYPE OF REINFORCEMENT	—	X	—	Sec. 1.13	Art. 2.4.3.4
d. WELDING OF REINFORCING BARS.	X	—	—	Sec. 2.1.10.7.2, 3.3.3.4(b)	—
e. PROTECTION OF MASONRY DURING COLD WEATHER (TEMPERATURE BELOW 40°F) OR HOT WEATHER (TEMPERATURE ABOVE 90°F).	—	X	—	—	Art. 1.8C, 1.8D
f. APPLICATION AND MEASUREMENT OF PRE-STRESSING FORCE.	—	X	—	—	Art. 3.6B
3. PRIOR TO GROUTING, THE FOLLOWING SHALL BE VERIFIED TO ENSURE COMPLIANCE:					
a. GROUT SPACE IS CLEAN.	—	X	—	—	Art. 3.2D
b. PLACEMENT OF REINFORCEMENT AND CONNECTORS AND PRE-STRESSING TENDONS AND ANCHORAGES.	—	X	—	Sec. 1.13	Art. 3.4
c. PROPORTIONS OF SITE-PREPARED GROUT AND PRE-STRESSING GROUT FOR BONDED TENDONS.	—	X	—	—	Art. 2.6B
d. CONSTRUCTION OF MORTAR JOINTS.	—	X	—	—	Art. 3.3B
4. GROUT PLACEMENT SHALL BE VERIFIED TO ENSURE COMPLIANCE WITH CODE AND CONSTRUCTION DOCUMENT PROVISIONS.	X	—	—	—	Art. 3.5
a. GROUTING OF PRE-STRESSING BONDED TENDONS.	X	—	—	—	Art. 3.6C
5. PREPARATION OF ANY REQUIRED GROUT SPECIMENS, MORTAR SPECIMENS AND/OR PRISMS SHALL BE OBSERVED.	X	—	—	—	Art. 1.4
6. COMPLIANCE WITH REQUIRED INSPECTION PROVISIONS OF THE CONSTRUCTION DOCUMENTS AND THE APPROVED SUBMITTALS SHALL BE VERIFIED.	—	X	—	—	Art. 1.5

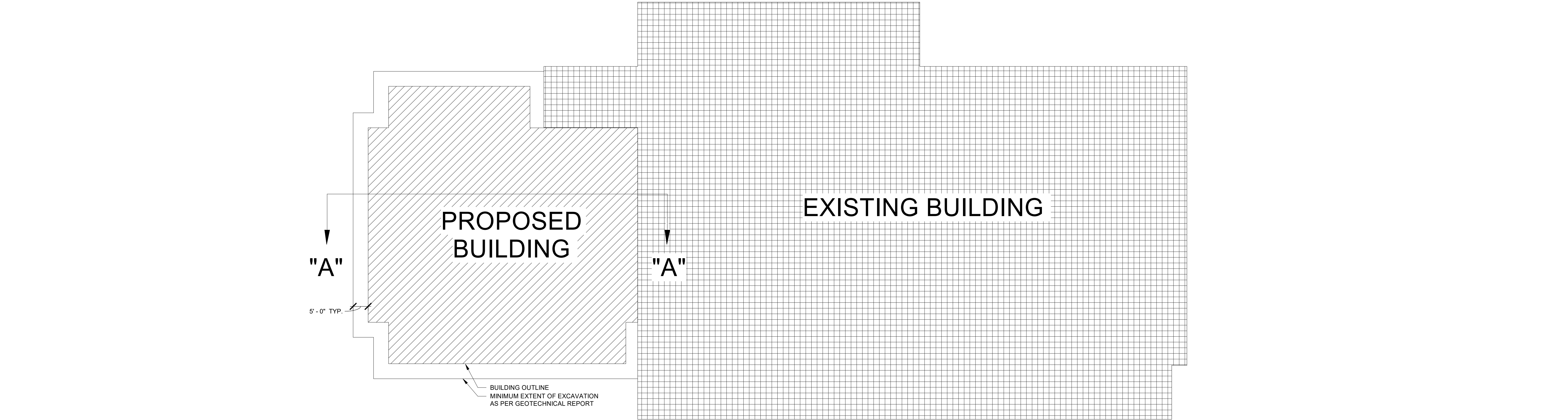
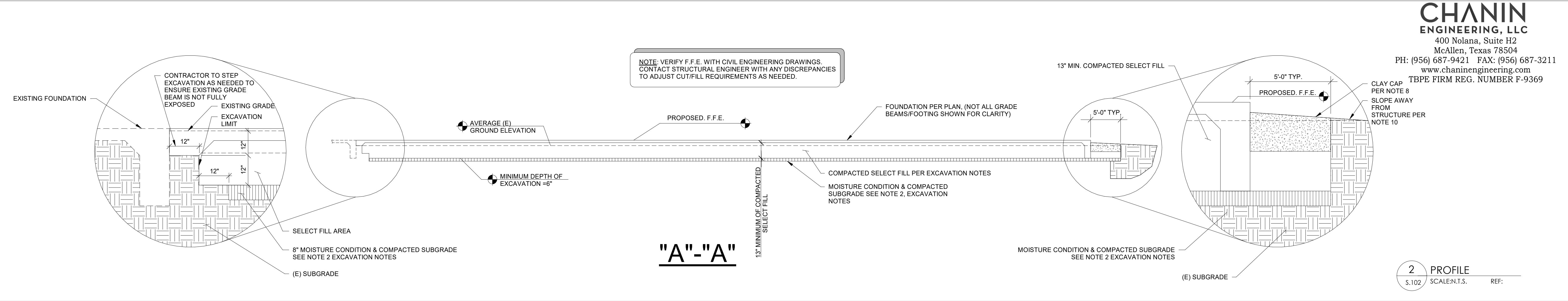
REQUIRED VERIFICATION AND INSPECTION OF STEEL CONSTRUCTION				
VERIFICATION AND INSPECTION	CONTINUOUS	PERIODIC	REFERENCED STANDARD	IBC REFERENCE
1. MATERIAL VERIFICATION OF HIGH-STRENGTH BOLTS, NUTS AND WASHERS:				
a. IDENTIFICATION MARKINGS TO CONFORM TO ASTM STANDARDS SPECIFIED IN THE APPROVED CONSTRUCTION DOCUMENTS.	—	X	APPLICABLE ASTM MATERIAL SPECIFICATIONS: AISC 360, SECTION A3.3	—
b. MANUFACTURER'S CERTIFICATE OF COMPLIANCE REQUIRED.	—	X	—	—
2. INSPECTION OF HIGH-STRENGTH BOLTING:				
a. BEARING-TYPE CONNECTIONS.	—	X	AISC 360, SECTION M2.5	—
b. SLIP-CRITICAL CONNECTIONS.	X	X		
3. MATERIAL VERIFICATION OF STRUCTURAL STEEL:				
a. IDENTIFICATION MARKINGS TO CONFORM TO ASTM STANDARDS SPECIFIED IN THE APPROVED CONSTRUCTION DOCUMENTS.	—	—	ASTM A 6 OR ASTM A568	—
b. MANUFACTURERS' CERTIFIED MILL TEST REPORTS.	—	—	ASTM A 6 OR ASTM A568	
4. MATERIAL VERIFICATION OF WELD FILLER MATERIALS:				
a. IDENTIFICATION MARKINGS TO CONFORM TO AWS SPECIFICATION IN THE APPROVED CONSTRUCTION DOCUMENTS.	—	—	AISC 360, SECTION A3.5	—
b. MANUFACTURER'S CERTIFICATE OF COMPLIANCE REQUIRED.	—	—	—	—
5. INSPECTION OF WELDING:				
a. STRUCTURAL STEEL:				
1) COMPLETE AND PARTIAL PENETRATION GROOVE WELDS.	X	—	AWS D1.1	—
2) MULTIPASS FILLET WELDS.	X	—		
3) SINGLE-PASS FILLET WELDS > 5/16"	X	—		
4) SINGLE-PASS FILLET WELDS ≤ 5/16"	—	X	AWS D1.3	—
5) FLOOR AND ROOF DECK WELDS.	—	X		
a. REINFORCING STEEL:	—	—		
1) VERIFICATION OF WELDABILITY OF REINFORCING STEEL OTHER THAN ASTM A 706.	—	X	AWS D1.4 ACI 318: 3.5.2	—
2) REINFORCING STEEL-RESISTING FLEXURAL AND AXIAL FORCES IN INTERMEDIATE AND SPECIAL MOMENT FRAMES, AND BOUNDARY ELEMENTS OF SPECIAL REINFORCED CONCRETE SHEAR WALLS AND SHEAR REINFORCEMENT.	X	—		
3) SHEAR REINFORCEMENT.	X	—		
4) OTHER REINFORCING STEEL.	—	X		
6. INSPECTION OF STEEL FRAME JOINT DETAILS FOR COMPLIANCE WITH APPROVED CONSTRUCTION DOCUMENTS:		X		
a. DETAILS SUCH AS BRACING AND STIFFENING.	—	—	—	—
b. MEMBER LOCATIONS.	—	—		
c. APPLICATION OF JOINT DETAILS AT EACH CONNECTION.	—	—		

TABLE 1705.2.2
REQUIRED VERIFICATION AND INSPECTION OF STEEL CONSTRUCTION OTHER THAN STRUCTURAL STEEL

VERIFICATION AND INSPECTION	CONTINUOUS	PERIODIC	REFERENCED STANDARD
1. MATERIAL VERIFICATION OF COLD-FORMED STEEL DECK.			
a. IDENTIFICATION MARKINGS TO CONFORM TO ASTM STANDARDS SPECIFIED IN THE APPROVED CONSTRUCTION DOCUMENTS.	—	X	APPLICABLE ASTM MATERIAL STANDARDS
b. MANUFACTURER'S CERTIFICATE TEST REPORTS.	—	X	—
2. INSPECTION OF WELDING:			
a. COLD-FORMED STEEL DECK:			
1) FLOOR AND ROOF DECK WELDS	—	X	AWS D1.3
b. REINFORCING STEEL:			
1) VERIFICATION OF WELDABILITY OF REINFORCING STEEL OTHER THAN ASTM A 706.	—	X	
1) REINFORCING STEEL RESISTING FLEXUAL AND AXIAL FORCES IN INTERMEDIATE AND SPECIAL MOMENT FRAMES, AND BOUNDARY ELEMENTS OF SPECIAL STRUCTURAL WALLS OF CONCRETE AND SHEAR REINFORCEMENT.		X	AWS D1.4 ACI 318: SECTION 3.5.2
3) SHEAR REINFORCEMENT.		X	—
4) OTHER REINFORCING STEEL.		X	

TABLE 1705.6
REQUIRED VERIFICATION AND INSPECTION OF SOILS

VERIFICATION AND INSPECTION TASK	CONTINUOUS DURING TASK LISTED	PERIODICALLY DURING TASK LISTED
1. VERIFY MATERIALS BELOW FOOTINGS ARE ADEQUATE TO ACHIEVE THE DESIGN BEARING CAPACITY.	—	X
2. VERIFY EXCAVATIONS ARE EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL.	—	X
3. PERFORM CLASSIFICATION AND TESTING OF COMPACTED FILL MATERIALS.	—	X
4. VERIFY USE OF PROPER MATERIALS, DENSITIES AND LIFT THICKNESSES DURING PLACEMENT AND COMPACTION OF CONTROLLED FILL.	X	—
5. PRIOR TO PLACEMENT OF CONTROLLED FILL, OBSERVE SUBGRADE AND VERIFY THAT SITE HAS BEEN PREPARED PROPERLY.	—	X



EXCAVATION NOTES:

- CONSTRUCTION AREAS REMOVE AT LEAST 6 INCHES OF TOP SOIL, VEGETATION, DEBRIS, ETC., FROM THE PROPOSED BUILDING AREA TO A DISTANCE OF 5'-0" OUTSIDE THE BUILDING LINE PROPOSED.
- EXPOSED SUBGRADE SHOULD BE THOROUGHLY PROOF ROLLED WITH A 15 TON PNEUMATIC ROLLER OR A FULLY LOADED DUMP TRUCK IN ORDER TO LOCATE AND DENSIFY ANY WEAK, COMPRESSIBLE ZONES. WEAK OR SOFT AREAS IDENTIFIED DURING PROOF ROLLING SHOULD BE REMOVED AND REPLACED WITH A SUITABLE, COMPACTED SELECT FILL IN ACCORDANCE WITH THE REQUIREMENTS BELOW. PRIOR TO FILL PLACEMENT, THE EXPOSED SUBGRADE SHOULD BE MOISTURE CONDITIONED BY SCARIFYING TO A MINIMUM DEPTH OF 8" AND RECOMPACTING TO A MINIMUM OF 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED FROM THE ASTM D-698 COMPACTION TEST. THE MOISTURE CONTENT SHOULD BE MAINTAINED AT OPTIMUM.
- FILL BACK TO REQUIRED GRADE (A MINIMUM OF 13" OF SELECT FILL IS REQUIRED. REFER TO CIVIL PLANS FOR FINISHED FLOOR ELEVATION TO DETERMINE ADDITIONAL AMOUNT OF SELECT FILL NEEDED) WITH MATERIAL SELECTED AND COMPACTED IN ACCORDANCE WITH THE REQUIREMENTS BELOW.
- SELECT FILL, WHEN PROPERLY SLAKED AND TESTED BY STANDARD LABORATORY METHODS, SHALL MEET THE FOLLOWING REQUIREMENTS:
 - AGGREGATE BASE COURSE- TOP SIX (6) INCHES OF BUILDING PAD SHALL CONSIST OF SOILS CLASSIFIED AS SC OR GC, BY THE USCS OR CALICHE OR CRUSHED LIMESTONE. THE CLAYEY GRAVEL AND CALICHE MATERIALS SHOULD MEET THE GRADATION REQUIREMENTS OF ITEM 247, TYPE B, GRADES 1 THROUGH 3 AS SPECIFIED IN THE 2014 TxDOT STANDARD SPECIFICATIONS MANUAL AND HAVE A PLASTICITY INDEX BETWEEN 7 AND 20. CRUSHED LIMESTONE OR CRUSHED CONCRETE MATERIAL SHOULD MEET THE REQUIREMENTS OF 2014 TxDOT ITEM 247, TYPE A OR D, GRADE 1-3. THE SELECT FILL MATERIALS SHOULD BE FREE OF ORGANIC MATERIAL AND DEBRIS, AND SHOULD NOT CONTAIN STONES LARGER THAN 2 INCHES IN THE MAXIMUM DIMENSION.
 - THE FOLLOWING SOILS, AS CLASSIFIED ACCORDING TO THE USCS, MAY BE CONSIDERED SATISFACTORY FOR USE AS SELECT FILL MATERIALS AT THIS SITE: CL, SC, AND COMBINATIONS OF THESE SOILS. IN ADDITION TO THE USCS CLASSIFICATION, SELECT FILL MATERIALS SHALL HAVE A MAXIMUM LIQUID LIMIT OF 35 PERCENT, A PLASTICITY INDEX BETWEEN 7 AND 20 PERCENT, AND A MAXIMUM PARTICLE SIZE NOT EXCEEDING 2 INCHES OR ONE-HALF THE LOOSE LIFT THICKNESS, WHICHEVER IS SMALLER.
- SAMPLES OF PROPOSED SELECT FILL SHALL BE FURNISHED TO THE TESTING LABORATORY 10 DAYS PRIOR TO INSTALLATION TO PERMIT TIME FOR SPECIFICATION COMPLIANCE INSPECTION AND APPROVAL.
- SELECT FILL UNDER ALL FLOORS AND WALKS SHALL BE COMPACTED IN THE FIELD IN LOOSE LIFTS NOT TO EXCEED 8" TO 95% OF THE MAXIMUM DENSITY, AT OR 2% OF THE OPTIMUM MOISTURE CONTENT, AS DETERMINED BY TEST METHOD ASTM D-698
- SITE PREPARATION TESTING SHALL BE AS FOLLOWS:
 - ATTERBERG LIMITS OF SELECT FILL MATERIAL:
 - ONE TEST PER 5,000 CY
 - COMPACTION TEST:
 - TO BE PERFORMED PER LIFT ON TEST PER 3,000 SF MINIMUM
 - FOUR TEST PER LIFT
- IF 5' PERIMETER OVER EXCAVATION IS NOT COVERED BY CONCRETE FLATWORK, PROVIDE 2' THICK CLAY CAP IN OVER EXCAVATED ZONE. CLAY CAP SHOULD BE SLOPED AWAY FROM THE FOUNDATION AT A MINIMUM SLOPE OF 2%, AND SURROUNDING AREAS SHOULD HAVE POSITIVE DRAINAGE. THE LOW PERMEANCE CLAY CAP SHALL MEET THE USCS CLASSIFICATION OF CH OR CL WITH A MINIMUM P.I. OF 20, A MINIMUM OF 50% BY WEIGHT PASSING THE NO. 200 SIEVE, AND SHALL BE COMPACTED TO A MINIMUM OF 95% MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D698. THE MOISTURE CONTENT OF THE SUBGRADE SHOULD BE MAINTAINED WITHIN THE RANGE OF OPTIMUM TO 4% ABOVE THE OPTIMUM MOISTURE.
- GEOTECHNICAL REPORT SHALL BE CONSIDERED A PART OF THE CONSTRUCTION DOCUMENTS. CONTRACTOR TO REVIEW AND COMPLY WITH ALL EARTHWORK AND GRADING REQUIREMENT IN GEOTECHNICAL REPORT.
- FINAL SITE GRADING TO SLOPE AWAY FROM THE STRUCTURE AND SHALL PREVENT WATER FROM PONDING IN THE AREAS ADJACENT TO THE STRUCTURE FOR A MINIMUM DISTANCE OF 10'-0". ANY PONDING CLOSE TO THE STRUCTURE MAY CREATE VOLUMETRIC CHANGES IN THE SOIL AND MAY LEAD TO LESS THAN OPTIMUM PERFORMANCE OF THE BUILDING FOUNDATION.

11720 NORTH IH35
AUSTIN, TEXAS 78753
PH: 512.474.6526
FAX: 512.474.6761

204 E. STUBBS
STREET
EDINBURG, TX
PH: 956.386.0611
FAX: 956.386.0613

NEGRETE & KOLAR
ARCHITECTS,LLP
WWW.NEKOARCH.COM

STATE OF TEXAS
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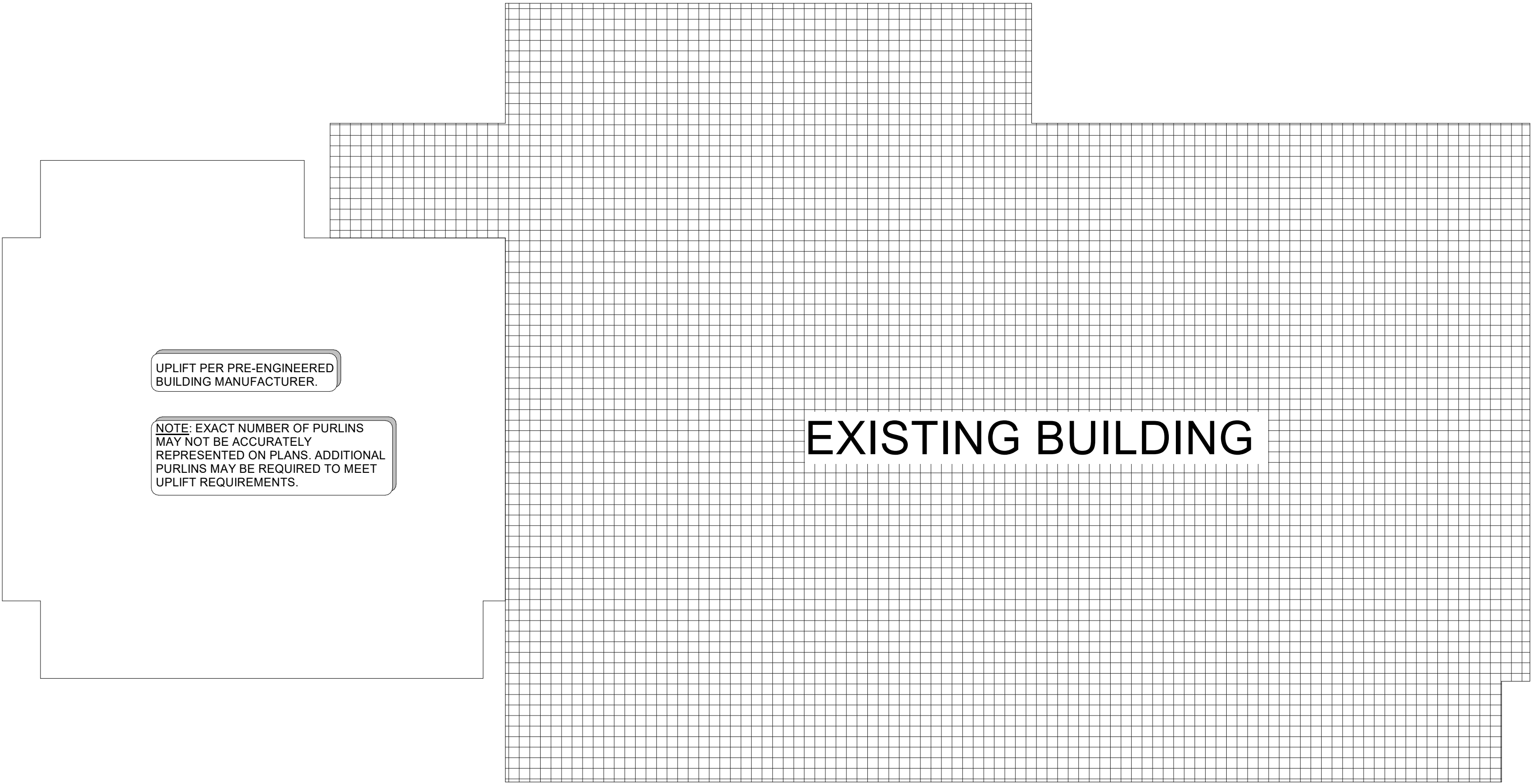
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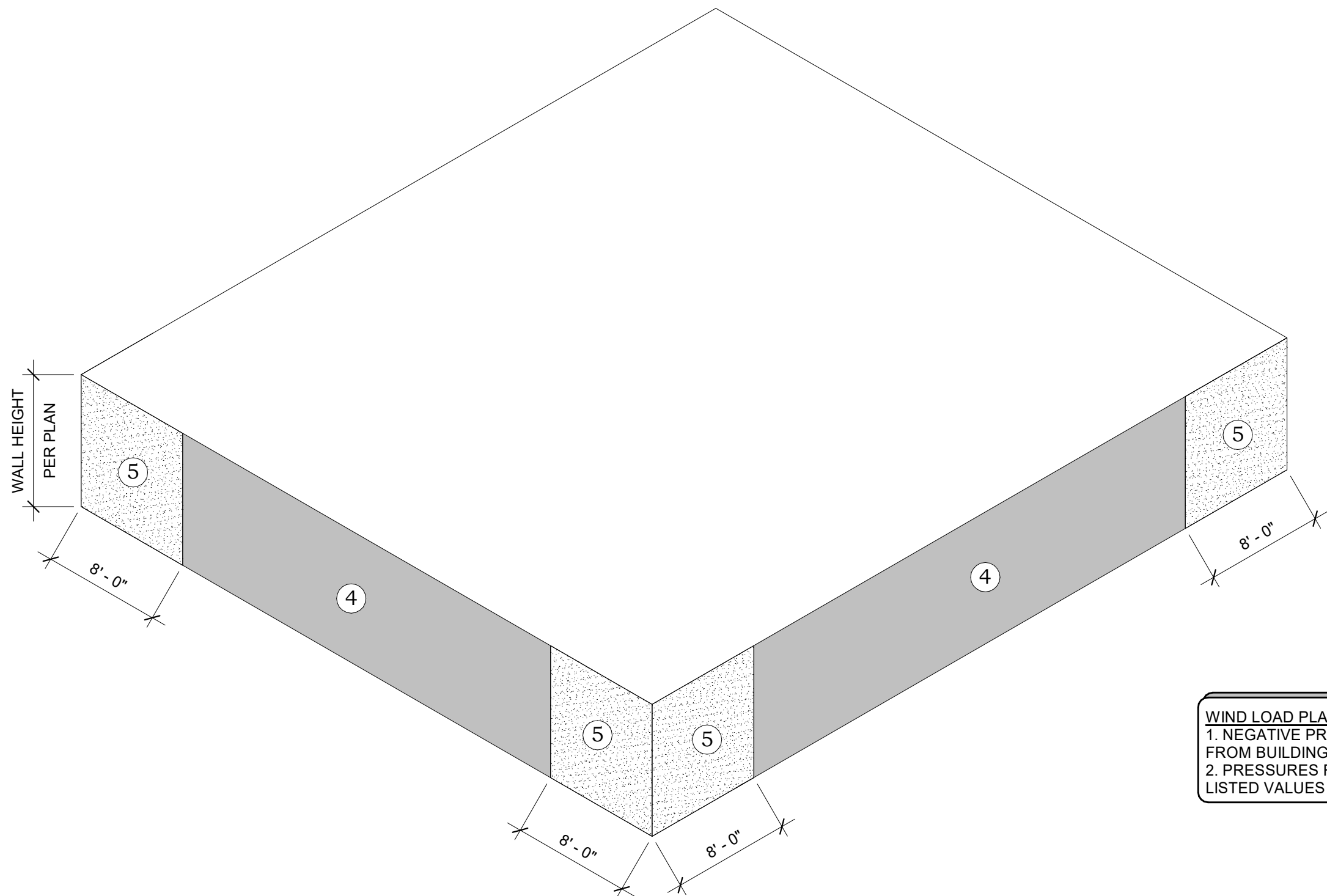
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EXCAVATION
PLAN

S.102



 1 ROOF UPLIFT PLAN
S.102 SCALE:N.T.S. REF:



WIND LOAD PLAN NOTES:
1. NEGATIVE PRESSURES DENOTE FORCE ACTING AWAY FROM BUILDING SURFACE (SUCTION).
2. PRESSURES FOR TRIBUTARY AREAS IN BETWEEN THE LISTED VALUES MAY BE LINEARLY INTERPOLATED.

EFFECTIVE WIND AREA	ZONE	MAX PRESSURE
10	4	29.6 psf
20	4	28.4 psf
50	4	26.8 psf
10	5	36.5 psf
20	5	34.1 psf
50	5	30.8 psf

2 COMPONENTS AND CLADDING
S.102 SCALE:N.T.S. REF:

CHANIN
ENGINEERING, LLC
400 Nolana, Suite H2
McAllen, Texas 78504
PH: (956) 687-9421 FAX: (956) 687-3211
www.chaninengineering.com
TBPE FIRM REG. NUMBER F-9369

11720 NORTH IH35
AUSTIN, TEXAS 78753
PH: 512.474.6526
FAX: 512.474.6761
204 E. STUBBS
STREET
EDINBURG, TX
PH: 956.386.0611
FAX: 956.386.0613

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ARCHITECTS^{LLP}
WWW.NEKOARCH.COM



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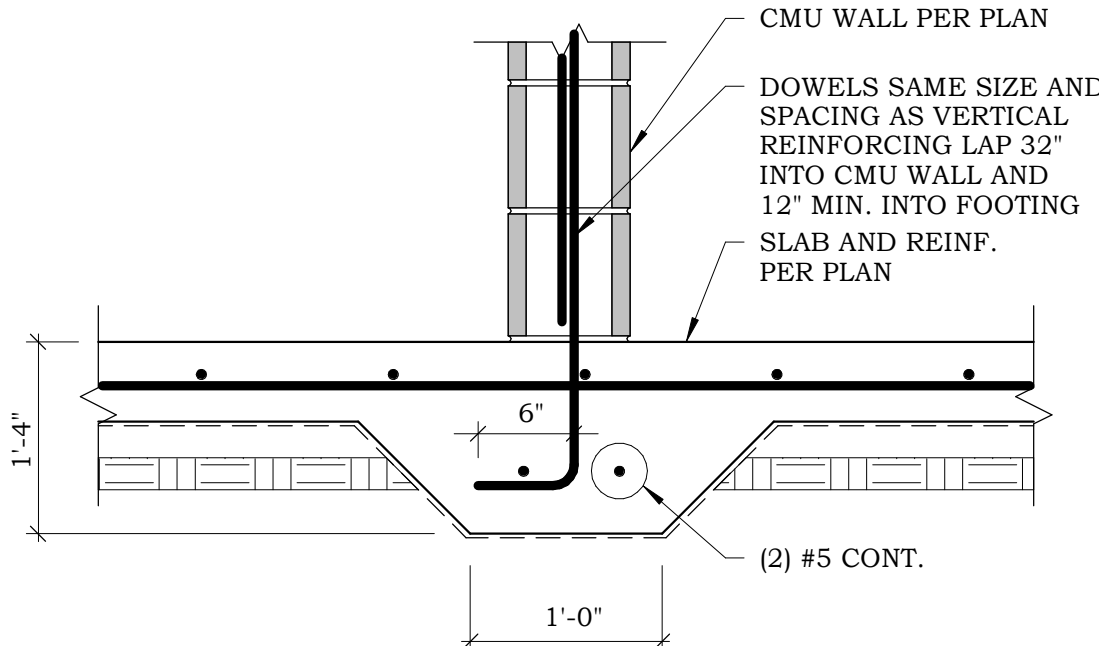
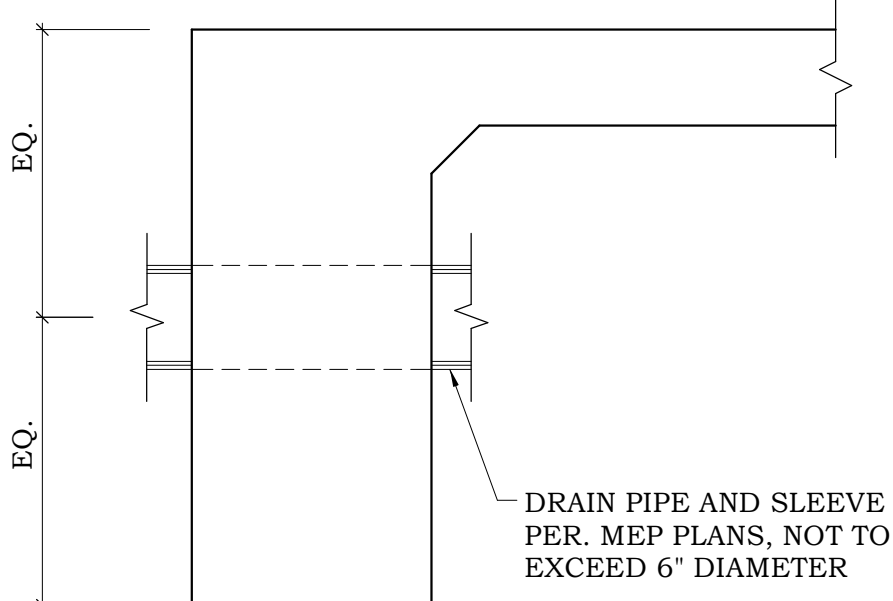
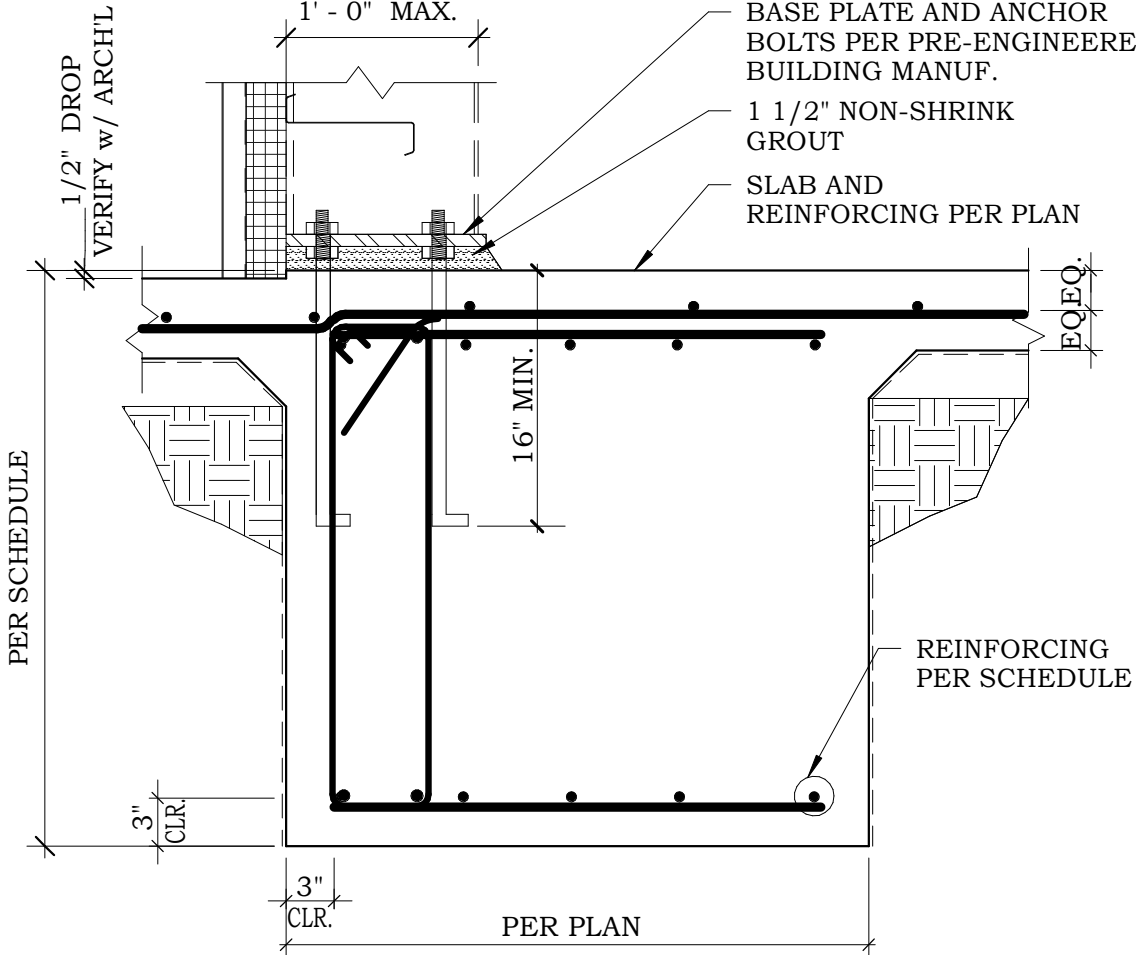
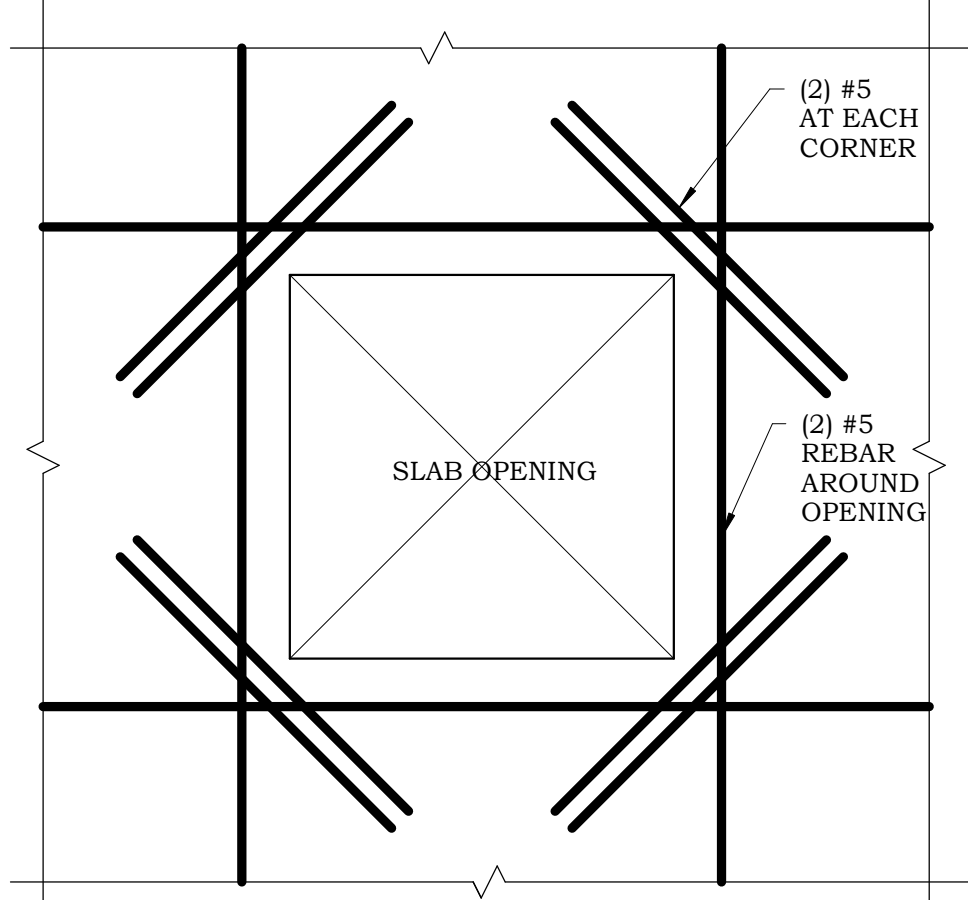
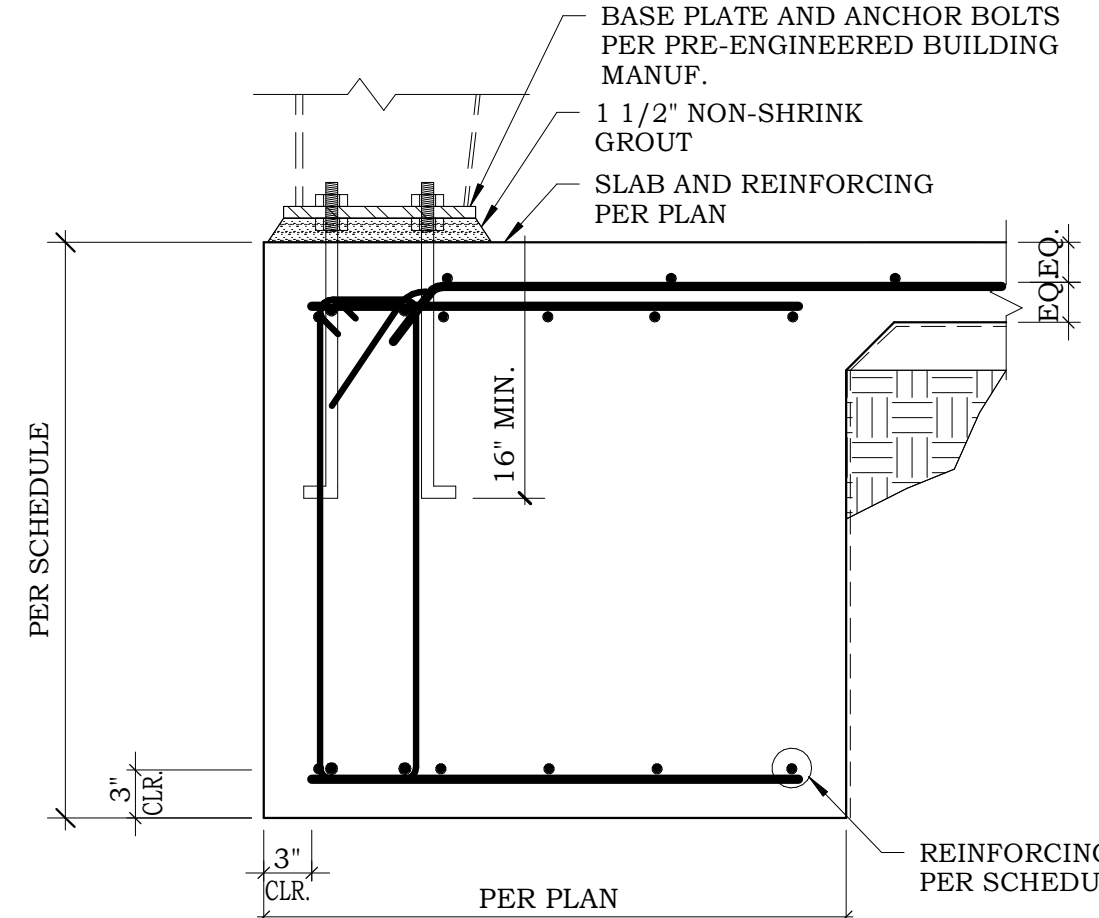
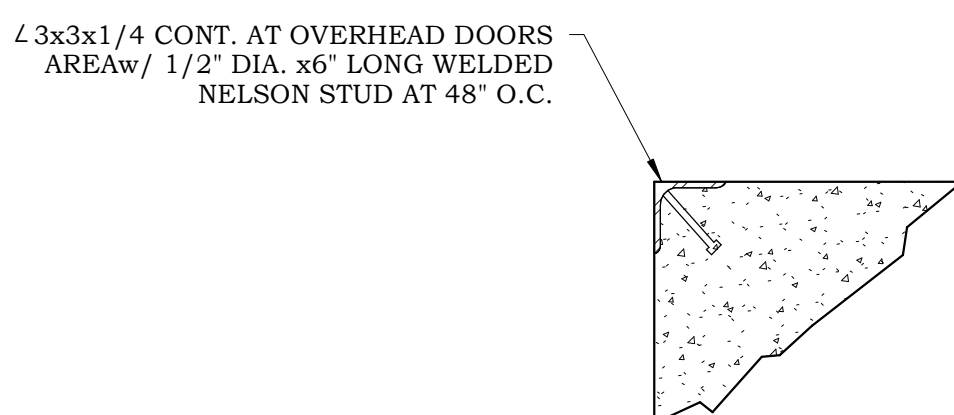
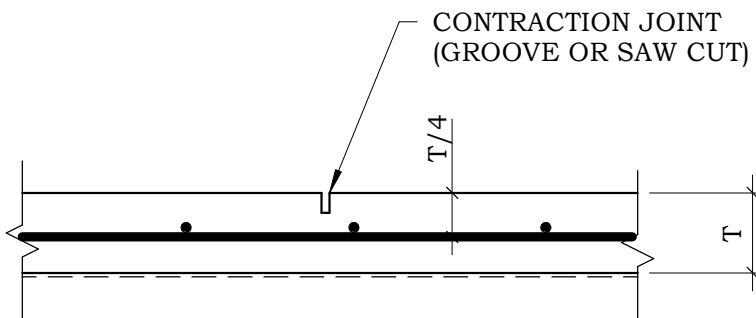
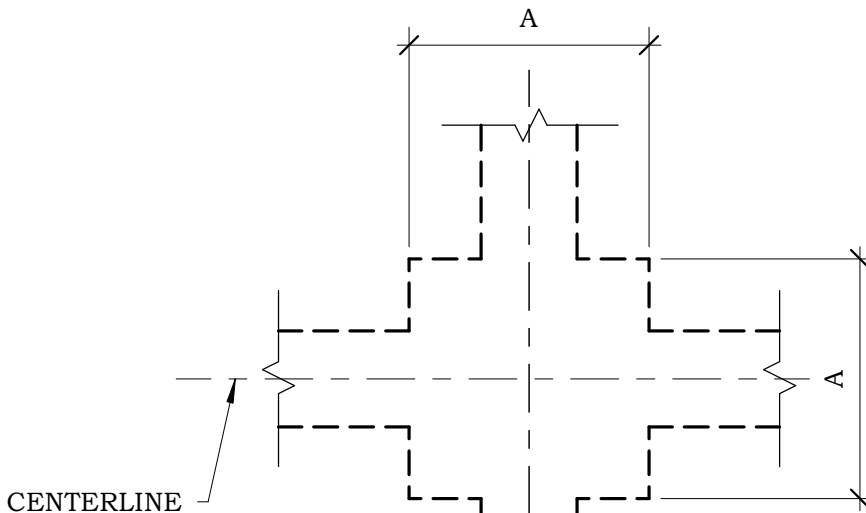
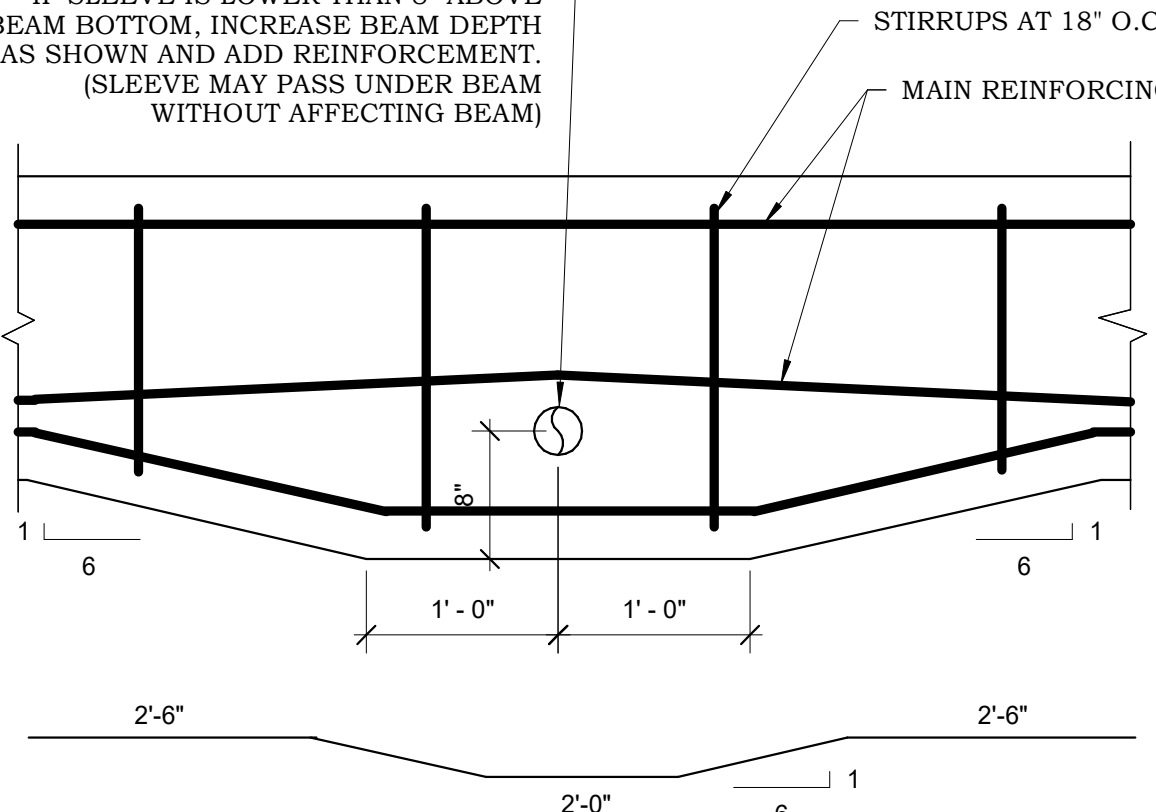
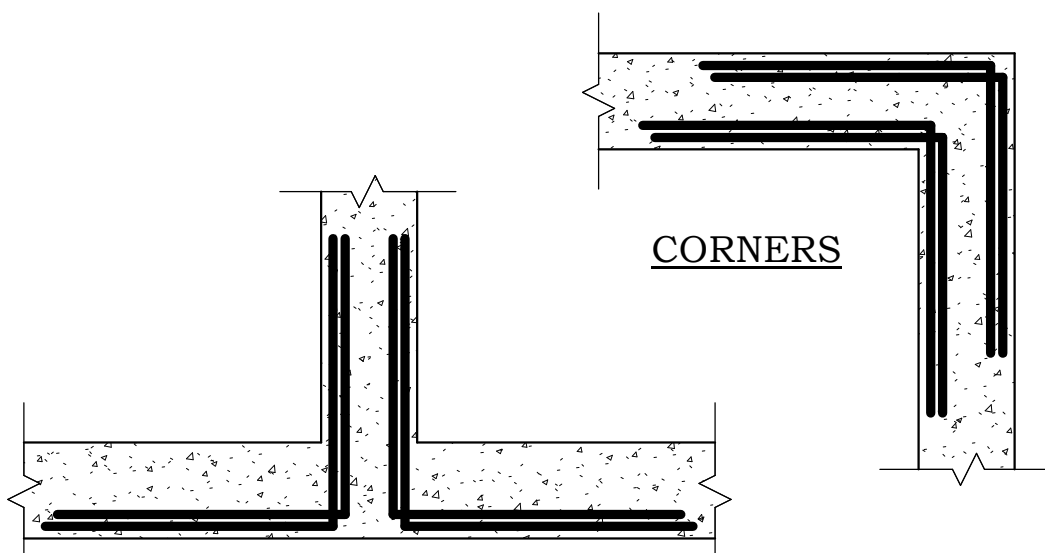
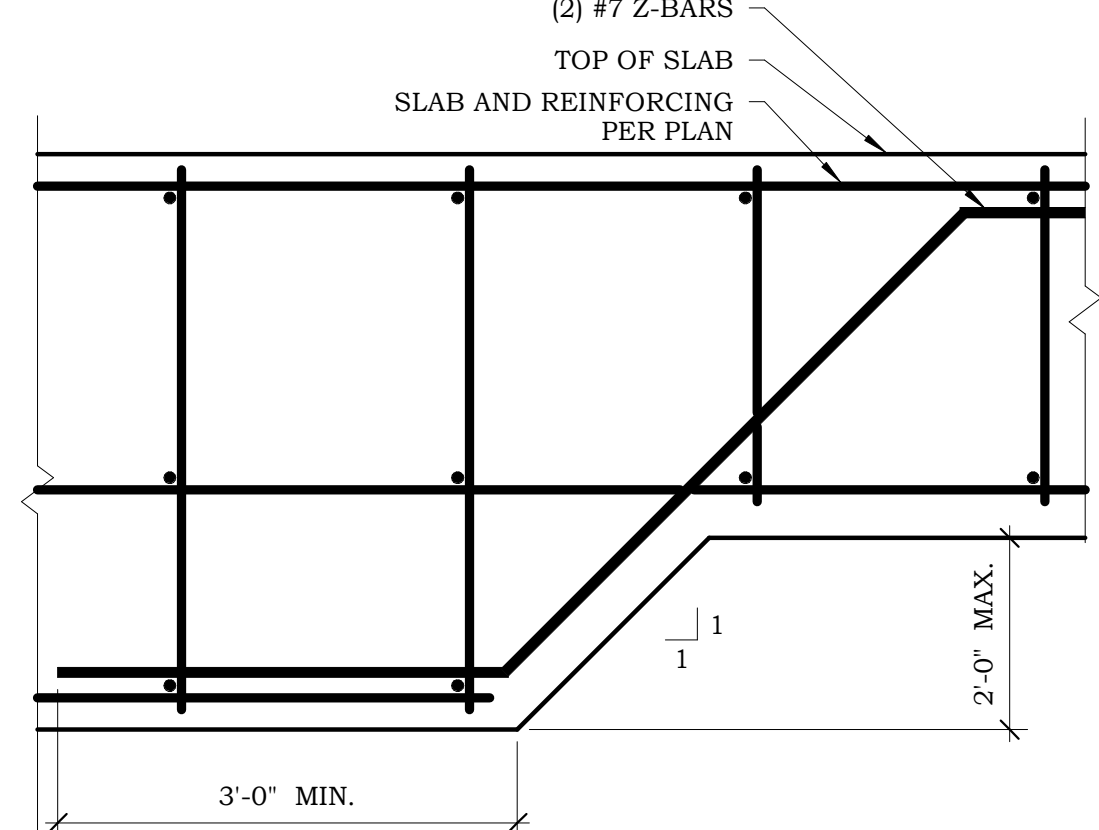
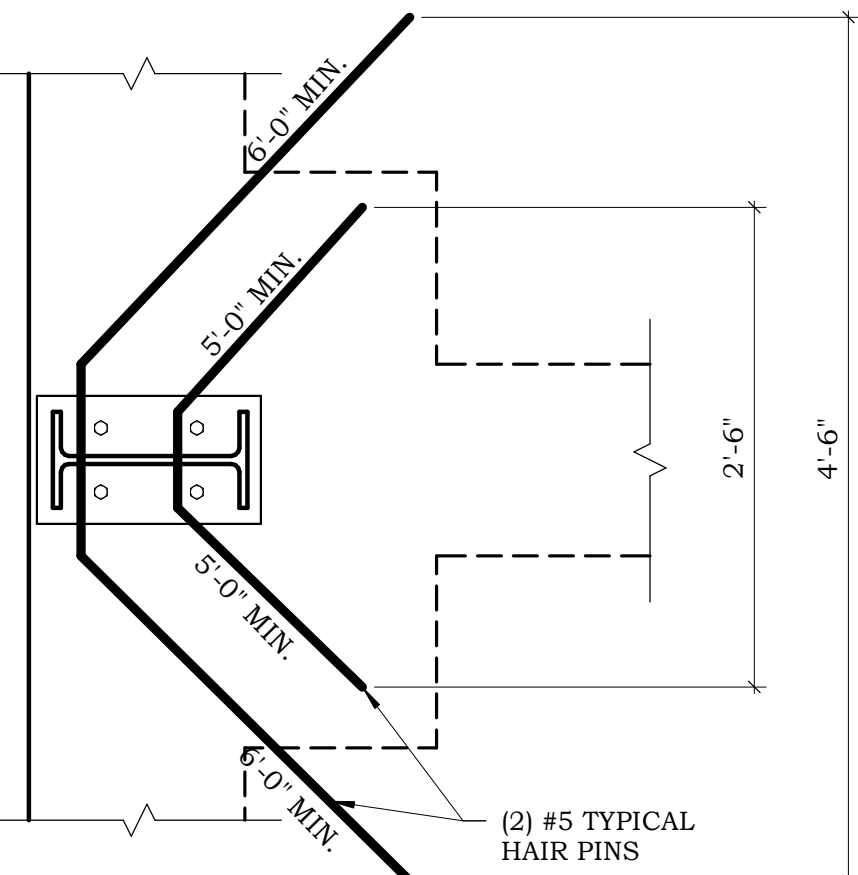
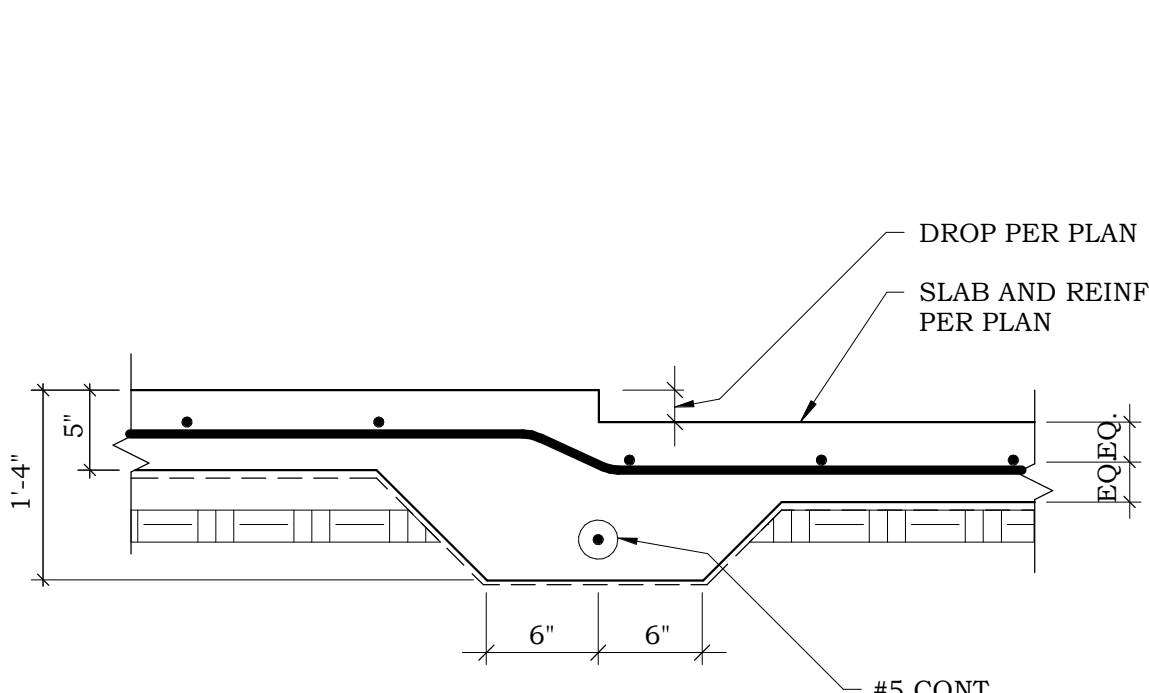
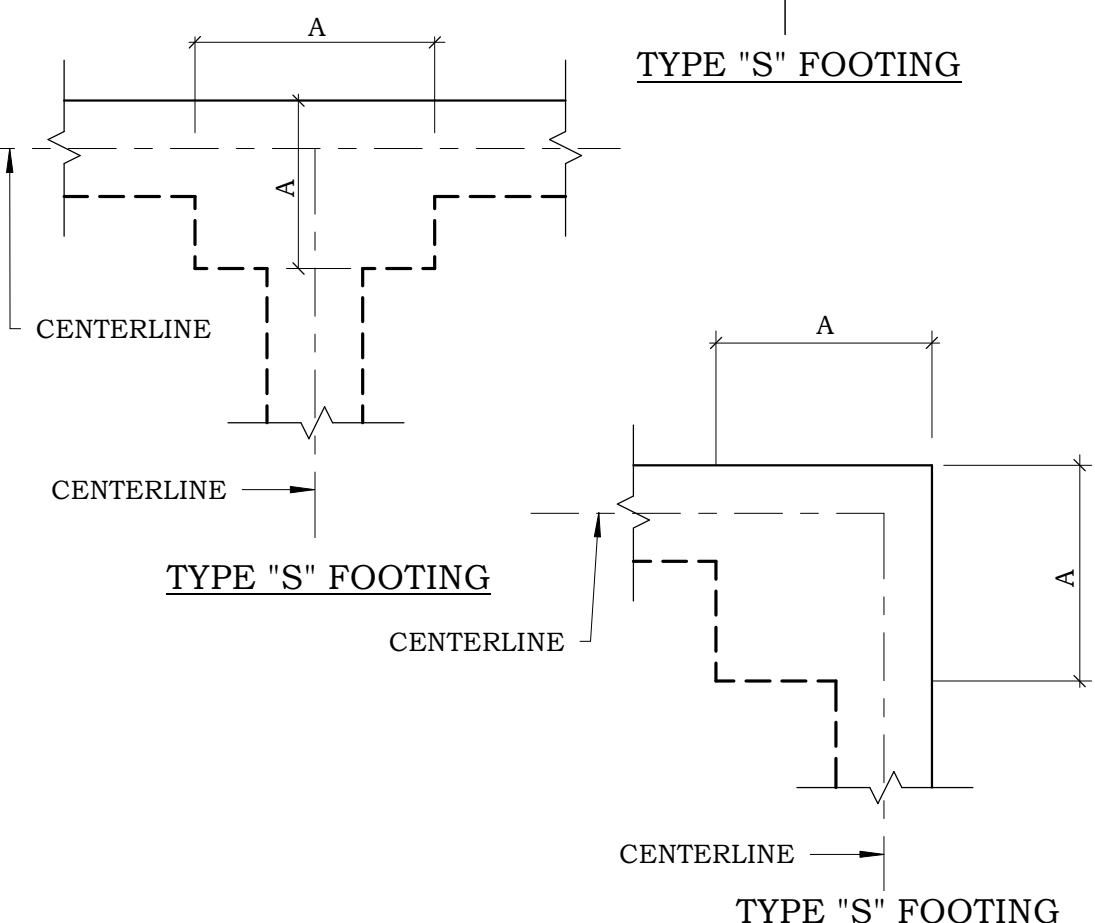
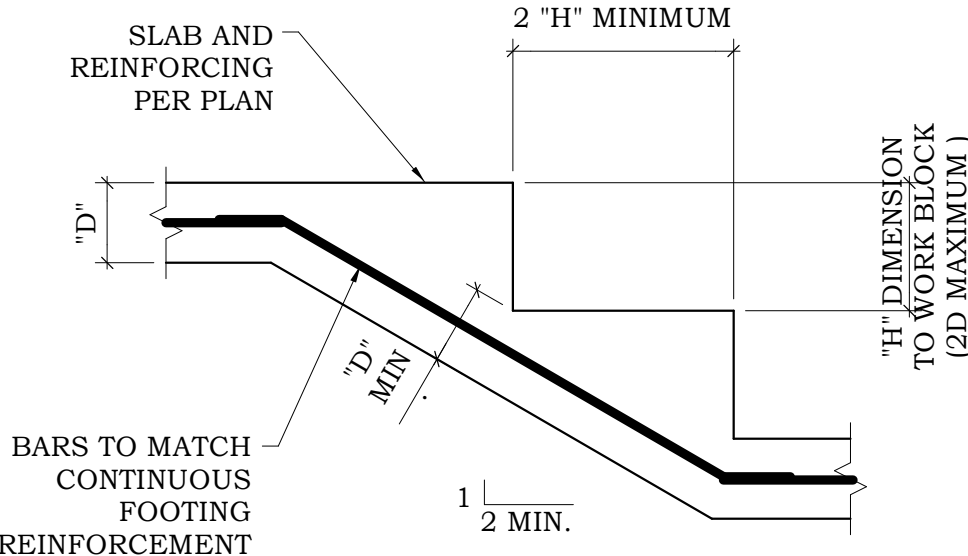
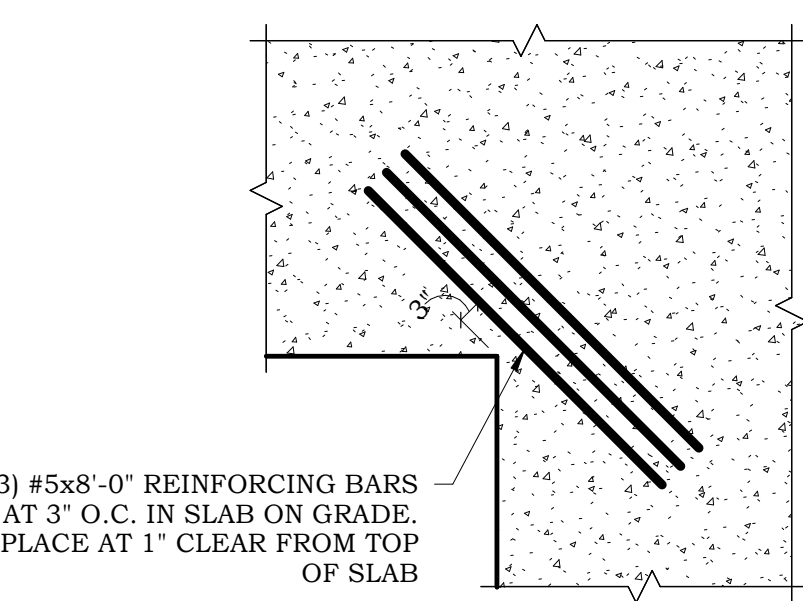
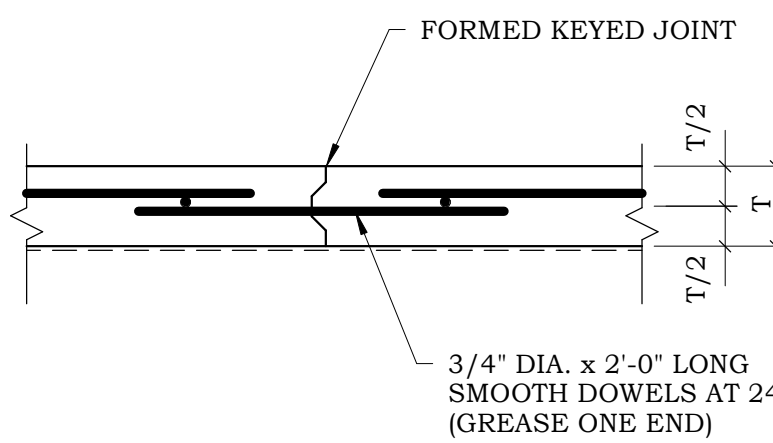
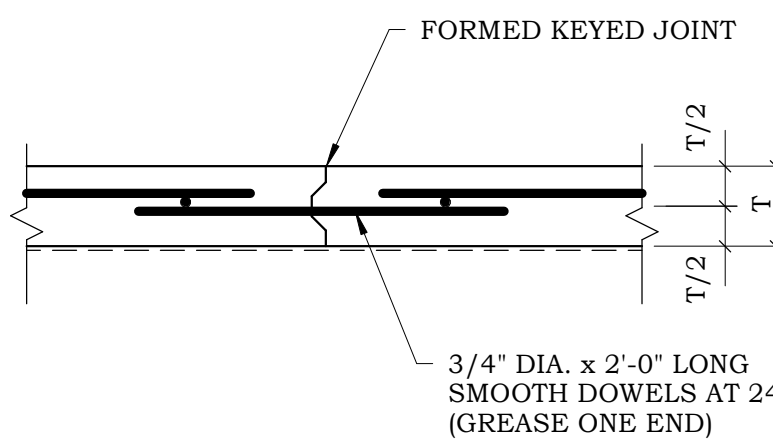
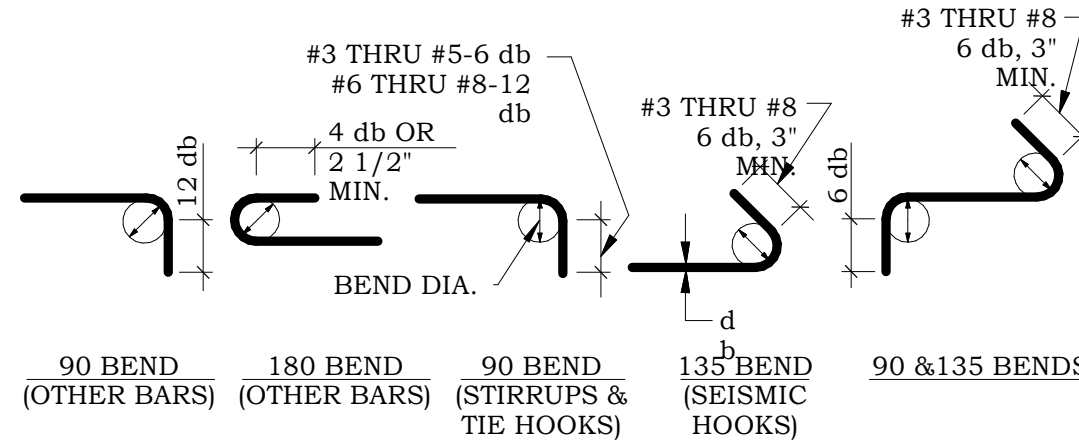
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ROOF UPLIFT
PLAN

S.103

 <p>CMU WALL PER PLAN DOWELS SAME SIZE AND SPACING AS VERTICAL REINFORCING LAP 32" INTO CMU WALL AND 12" MIN. INTO FOOTING SLAB AND REINF. PER PLAN 1'-4" 6" 1'-0" (2) #5 CONT.</p>		 <p>EQ. EQ. DRAIN PIPE AND SLEEVE PER. MEP PLANS, NOT TO EXCEED 6" DIAMETER</p>		 <p>1'-0" MAX. 1 1/2" NON-SHRINK GROUT SLAB AND REINFORCING PER PLAN 16" MIN. 3" CLR. 3" CLR. PER PLAN PER SCHEDULE REINFORCING PER SCHEDULE</p>		 <p>(2) #5 AT EACH CORNER SLAB OPENING (2) #5 REBAR AROUND OPENING</p>		<div><div><div><div>CHANIN</div><div>ENGINEERING, LLC</div><div>400 Nolana, Suite H2</div><div>McAllen, Texas 78504</div><div>PH: (956) 687-9421 FAX: (956) 687-3211</div><div>www.chaninengineering.com</div><div>TBPE FIRM REG. NUMBER F-9369</div></div></div></div>																																									
THICKENED SLAB AT NON-BEARING CMU WALL	17	PIPE EXTERIOR FOOTING	13	FOOTING AT STEEL COLUMN	9	OPENINGS IN SLAB	5	NOT USED	1																																								
 <p>BASE PLATE AND ANCHOR BOLTS PER PRE-ENGINEERED BUILDING MANUF. 1 1/2" NON-SHRINK GROUT SLAB AND REINFORCING PER PLAN 16" MIN. 3" CLR. 3" CLR. PER PLAN PER SCHEDULE REINFORCING PER SCHEDULE</p>		 <p>∟3x3x1/4 CONT. AT OVERHEAD DOORS AREA w/ 1/2" DIA. x6" LONG WELDED NELSON STUD AT 48" O.C.</p>		 <p>CONTRACTION JOINT (GROOVE OR SAW CUT) T/4 T 1. JOINT PATTERN SHALL BE NEARLY SQUARE 2. JOINT SPACING SHALL NOT EXCEED 15'-0"</p>		<table><tr><th colspan="5">FOOTING SCHEDULE AT STEEL COLUMNS</th></tr><tr><th>TYPE</th><th>A</th><th>DEPTH</th><th colspan="2">REBAR REINFORCEMENT</th></tr><tr><td>S2</td><td>2'-6"</td><td>3'-0"</td><td colspan="2">#5'S AT 12" O.C. E.W. TOP & BOTTOM</td></tr><tr><td>S3</td><td>3'-6"</td><td>3'-0"</td><td colspan="2">#5'S AT 12" O.C. E.W. TOP & BOTTOM</td></tr><tr><td>S4</td><td>4'-6"</td><td>3'-0"</td><td colspan="2">#5'S AT 12" O.C. E.W. TOP & BOTTOM</td></tr><tr><td>S5</td><td>5'-6"</td><td>3'-0"</td><td colspan="2">#5'S AT 12" O.C. E.W. TOP & BOTTOM</td></tr><tr><td>S6</td><td>6'-6"</td><td>3'-0"</td><td colspan="2">#5'S AT 12" O.C. E.W. TOP & BOTTOM</td></tr><tr><td>S7</td><td>7'-6"</td><td>3'-0"</td><td colspan="2">#6'S AT 12" O.C. E.W. TOP & BOTTOM</td></tr></table>  <p>CENTERLINE CENTERLINE TYPE "S" FOOTING TYPE "S" FOOTING TYPE "S" FOOTING</p>		FOOTING SCHEDULE AT STEEL COLUMNS					TYPE	A	DEPTH	REBAR REINFORCEMENT		S2	2'-6"	3'-0"	#5'S AT 12" O.C. E.W. TOP & BOTTOM		S3	3'-6"	3'-0"	#5'S AT 12" O.C. E.W. TOP & BOTTOM		S4	4'-6"	3'-0"	#5'S AT 12" O.C. E.W. TOP & BOTTOM		S5	5'-6"	3'-0"	#5'S AT 12" O.C. E.W. TOP & BOTTOM		S6	6'-6"	3'-0"	#5'S AT 12" O.C. E.W. TOP & BOTTOM		S7	7'-6"	3'-0"	#6'S AT 12" O.C. E.W. TOP & BOTTOM		<p>IF SLEEVE IS LOWER THAN 8" ABOVE BEAM BOTTOM, INCREASE BEAM DEPTH AS SHOWN AND ADD REINFORCEMENT. (SLEEVE MAY PASS UNDER BEAM WITHOUT AFFECTING BEAM)</p>  <p>STIRRUPS AT 18" O.C. MAIN REINFORCING 1'-0" 1'-0" 2'-6" 2'-0" 6</p>	
FOOTING SCHEDULE AT STEEL COLUMNS																																																	
TYPE	A	DEPTH	REBAR REINFORCEMENT																																														
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FOOTING AT STEEL COLUMN	18	EXTERIOR FOOTING AT OVERHEAD DOOR	14	CONTRACTION JOINT DETAIL	10	 <p>CORNERS "T" INTERSECTIONS NOTE: PROVIDE (4) #6 x 6'-0" CORNER BARS (2-TOP & 2-BOTTOM) AS SHOWN IN DETAILS ABOVE</p>		TYPICAL SLEEVE IN GRADE BEAM	2																																								
 <p>(2) #7 Z-BARS TOP OF SLAB SLAB AND REINFORCING PER PLAN 3'-0" MIN. 2'-0" MAX. ELEVATION</p>		 <p>6'-0" MIN. 5'-0" MIN. 5'-0" MIN. 6'-0" MIN. (2) #5 TYPICAL HAIR PINS 2'-6" 4'-6"</p>		 <p>DROP PER PLAN SLAB AND REINF. PER PLAN 1'-4" 5" 6" 6" #5 CONT. EQEQ.</p>		 <p>FORMED KEYED JOINT 3/4" DIA. x 2'-0" LONG SMOOTH DOWELS AT 24" O.C. (GREASE ONE END) T/2 T/2 1. CONTRACTOR TO SUBMIT ANY PROPOSED LOCATIONS OF CONSTRUCTION JOINTS TO STRUCTURAL ENGINEER BEFORE COMMENCING WORK. 2. GRADE BEAM REINFORCING SHALL BE CONTINUOUS THRU JOINT</p>		FOOTING SCHEDULE		7																																							
GRADE BEAM TRANSITION DETAIL	19	TYPICAL HAIR PINS	15	DROP AT SLAB ON GRADE	11	FOOTING SCHEDULE		7	TYPICAL CORNER BARS	3																																							
 <p>SLAB AND REINFORCING PER PLAN 2 "H" MINIMUM "D" MIN. 1 2 MIN. BARS TO MATCH CONTINUOUS FOOTING REINFORCEMENT "H" DIMENSION TO WORK BLOCK (2D MAXIMUM)</p>		 <p>(3) #5x8'-0" REINFORCING BARS AT 3" O.C. IN SLAB ON GRADE. PLACE AT 1" CLEAR FROM TOP OF SLAB</p>		 <p>FORMED KEYED JOINT 3/4" DIA. x 2'-0" LONG SMOOTH DOWELS AT 24" O.C. (GREASE ONE END) T/2 T/2 1. CONTRACTOR TO SUBMIT ANY PROPOSED LOCATIONS OF CONSTRUCTION JOINTS TO STRUCTURAL ENGINEER BEFORE COMMENCING WORK. 2. GRADE BEAM REINFORCING SHALL BE CONTINUOUS THRU JOINT</p>		 <p>FORMED KEYED JOINT 3/4" DIA. x 2'-0" LONG SMOOTH DOWELS AT 24" O.C. (GREASE ONE END) T/2 T/2 1. CONTRACTOR TO SUBMIT ANY PROPOSED LOCATIONS OF CONSTRUCTION JOINTS TO STRUCTURAL ENGINEER BEFORE COMMENCING WORK. 2. GRADE BEAM REINFORCING SHALL BE CONTINUOUS THRU JOINT</p>		 <p>90 BEND (OTHER BARS) 180 BEND (OTHER BARS) 90 BEND (STIRRUPS & TIE HOOKS) 135 BEND (SEISMIC HOOKS) 90 & 135 BENDS BEND DIA. 2 db 4 db OR 2 1/2" MIN. #3 THRU #5-6 db #6 THRU #8-12 db #3 THRU #8 6 db, 3" MIN. #3 THRU #8 6 db, 3" MIN. DIA.</p> <table><tr><th colspan="2">DIAMETER OF BENDS</th></tr><tr><td>STIRRUPS AND TIES</td><td>4 db FOR #3 THRU #5 BARS</td></tr><tr><td></td><td>6 db FOR #6 THRU #8 BARS</td></tr><tr><td></td><td>6 db FOR #3 THRU #8 BARS</td></tr><tr><td></td><td>8 db FOR #9 THRU #11 BARS</td></tr><tr><td>ALL OTHERS</td><td>10 db FOR #14 THRU #18 BARS</td></tr></table>		DIAMETER OF BENDS		STIRRUPS AND TIES	4 db FOR #3 THRU #5 BARS		6 db FOR #6 THRU #8 BARS		6 db FOR #3 THRU #8 BARS		8 db FOR #9 THRU #11 BARS	ALL OTHERS	10 db FOR #14 THRU #18 BARS	TYPICAL CORNER BARS		4																									
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NOT USED	20	TYPICAL STEPPED FOOTING	16	TYPICAL SLAB REINFORCING	12	CONSTRUCTION JOINT DETAIL	8	STANDARD HOOKS		4																																							



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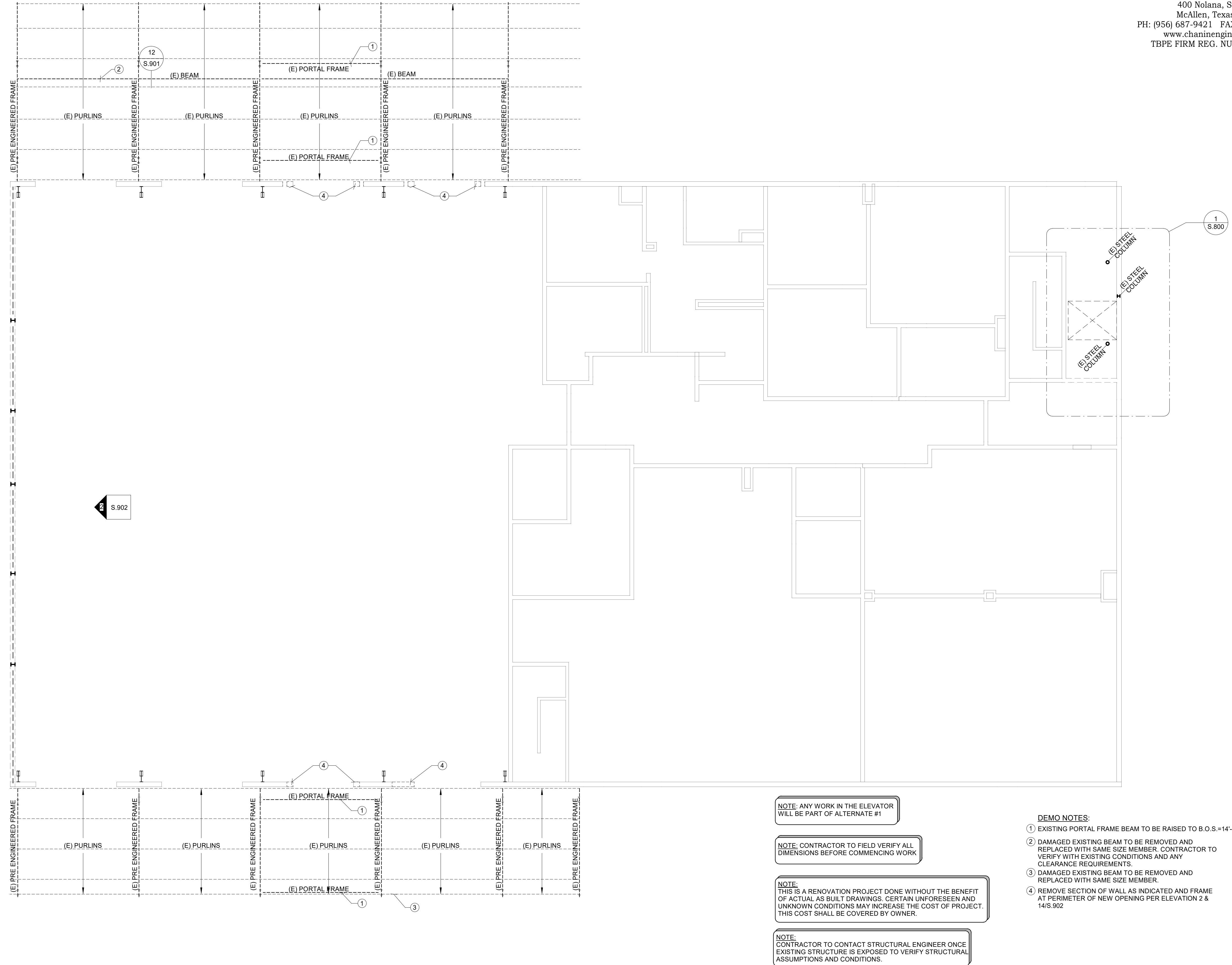
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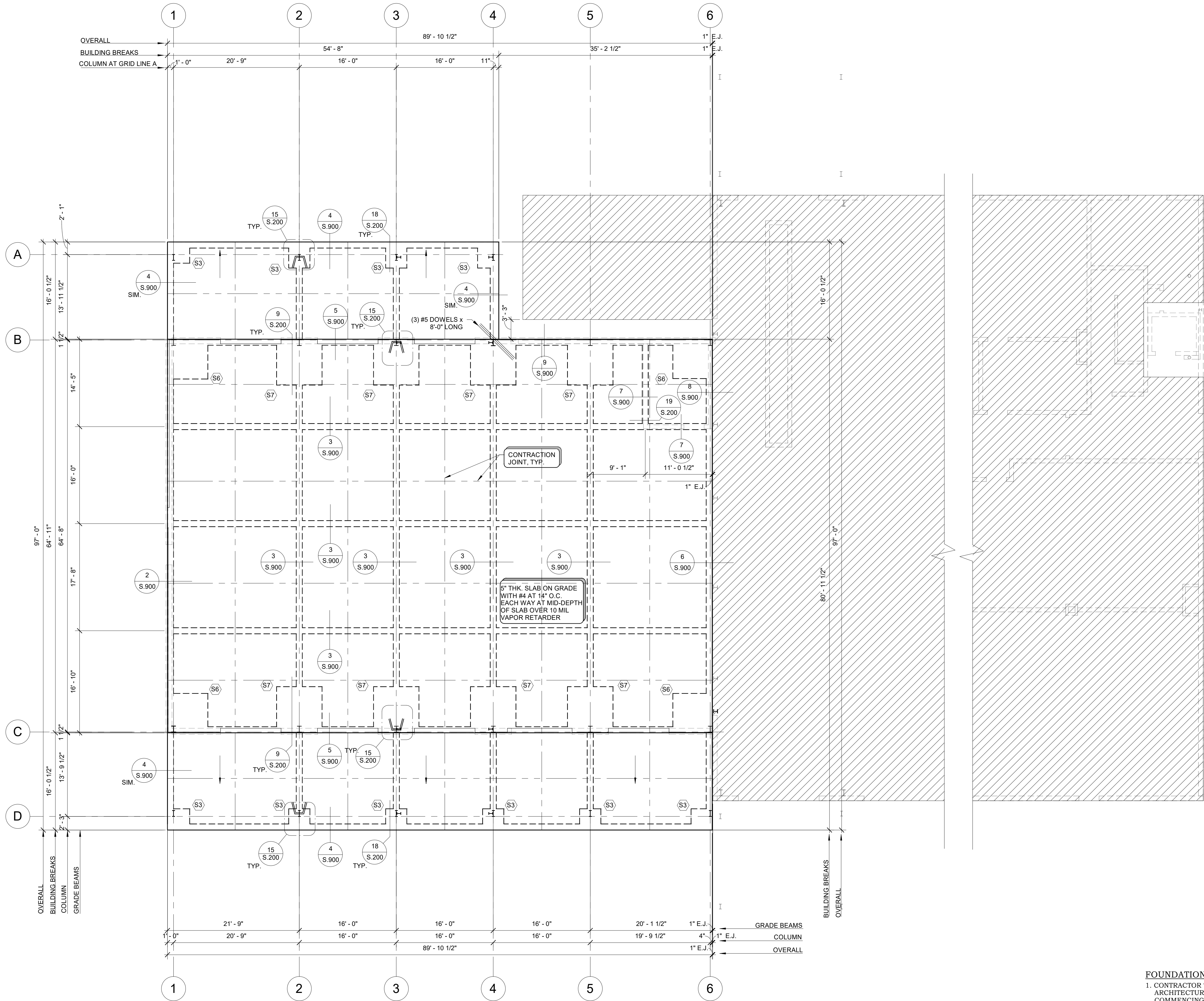
McAllen, Texas

DRAWN BY: E.F.S.		
ISSUED	06/7/19	
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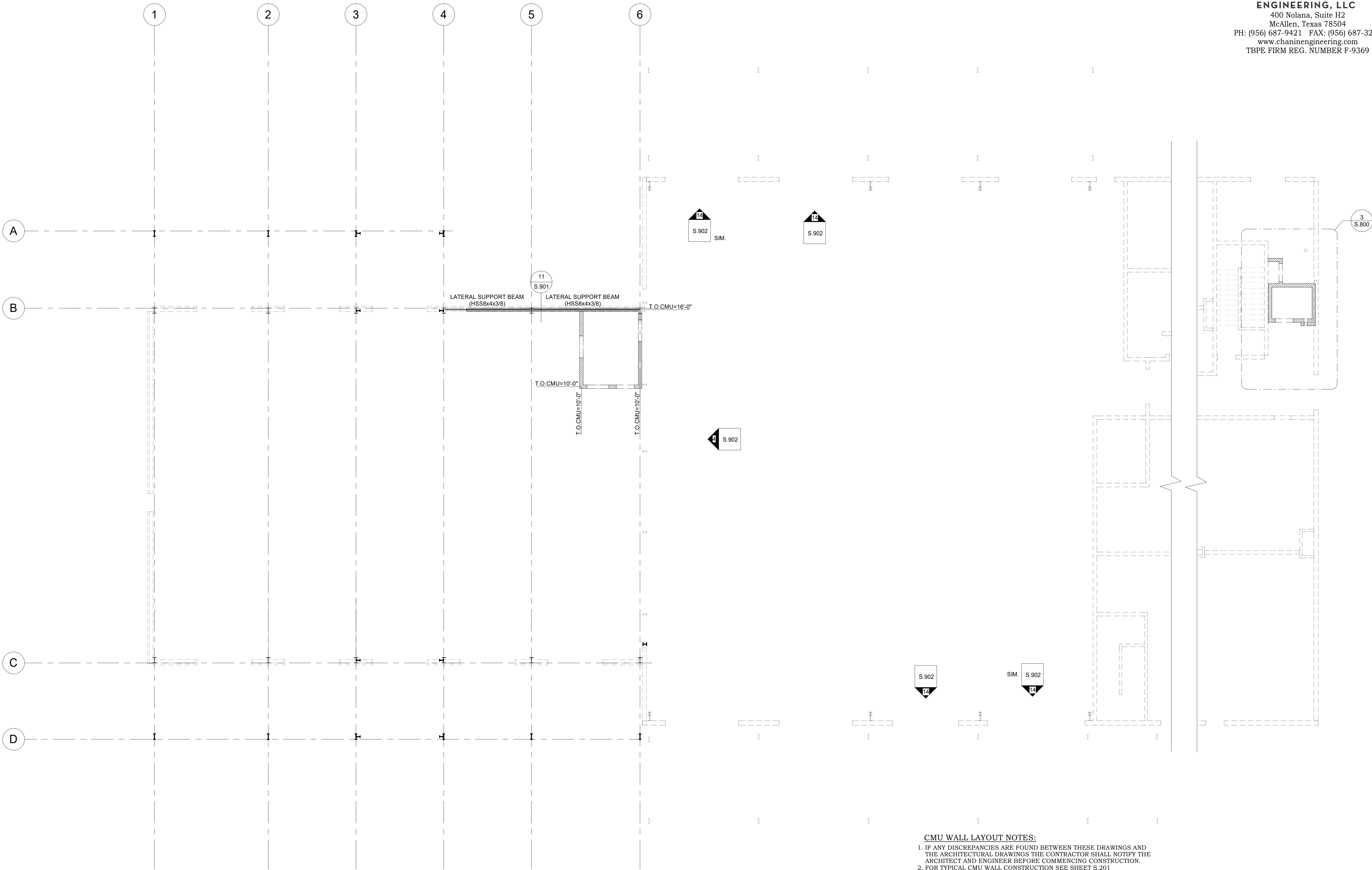
DEMO PLAN

S.300



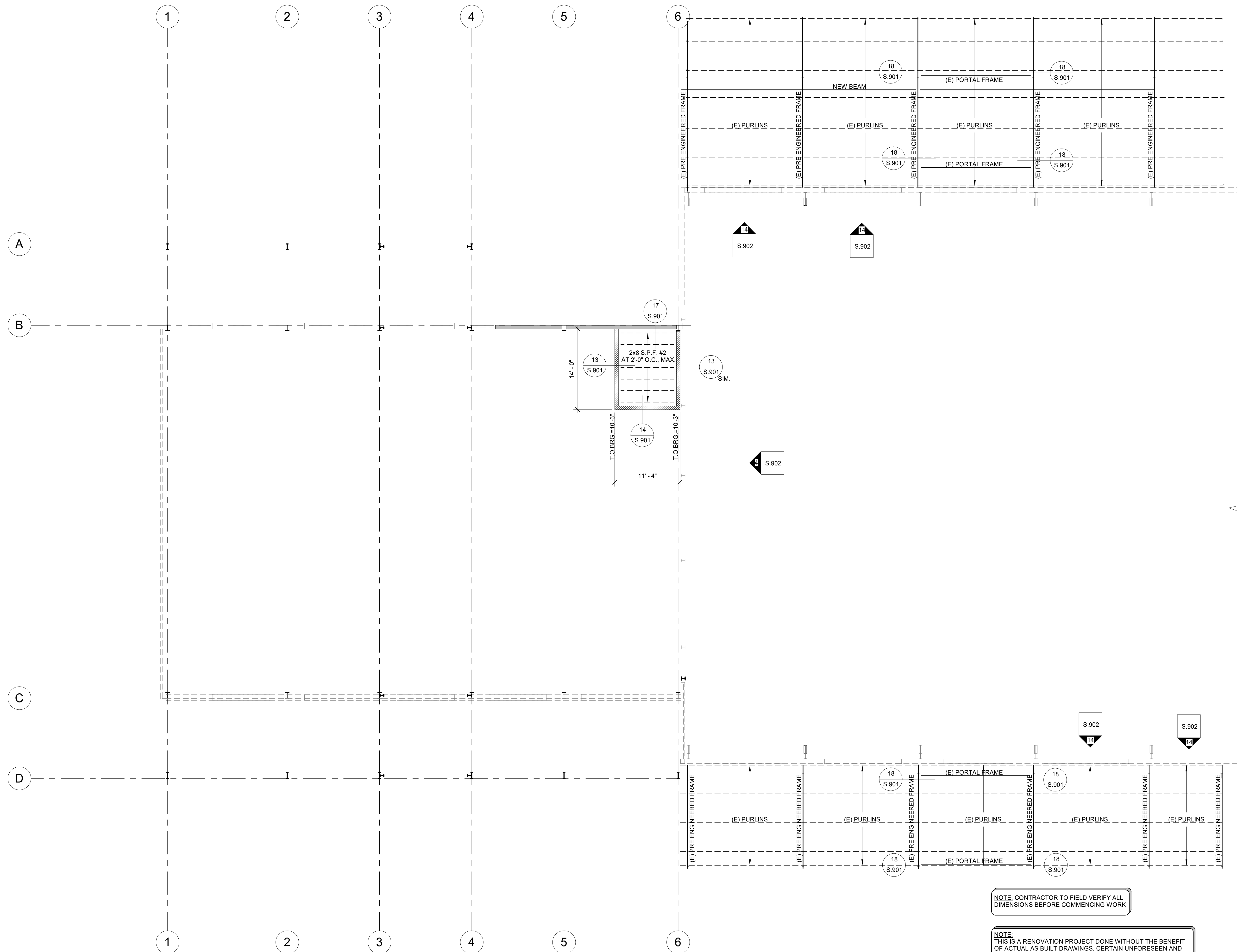


FOUNDATION NOTES:
1. CONTRACTOR TO VERIFY ALL DIMENSIONS WITH ARCHITECTURAL PLANS AND EXISTING CONDITIONS BEFORE COMMENCING WORK.
2. CONTRACTOR TO VERIFY LOCATION OF ANY/ALL DROPS AND DRAINS IN SLAB WITH ARCHITECTURAL DRAWINGS.
3. CONTRACTOR TO VERIFY REQUIRED F.F.E. WITH CIVIL ENGINEERING DRAWINGS.



CMU WALL LAYOUT NOTES:

- IF ANY DISCREPANCIES ARE FOUND BETWEEN THESE DRAWINGS AND THE ARCHITECTURAL DRAWINGS THE CONTRACTOR SHALL NOTIFY THE ARCHITECT AND ENGINEER BEFORE COMMENCING CONSTRUCTION.
- FOR TYPICAL CMU WALL CONSTRUCTION SEE SHEET S.201
- FOR TYPICAL ATTACHMENT AT THE TOP OF ALL INTERIOR CMU WALLS (INCLUDING THOSE NOT SHOWN ON THIS PLAN) SEE DETAILS 14,15/S.201
- INDICATES EXTERIOR 8" CMU WALL WITH #6 (V) AT 32" O.C. AND #5 (H) AT 8'-0" O.C., U.N.O.
- INDICATES INTERIOR 8" CMU WALL WITH #5 (V) AT 48" O.C. AND #5 (H) AT 8'-0" O.C., U.N.O.
- INDICATES CMU LINTEL, SEE DETAIL 7/S.201
- FOR SPECIAL INSPECTION REQUIREMENTS SEE GENERAL NOTES.
- ALL TOP OF WALLS FROM FINISH FLOOR ELEVATION 0'-0".
- SEE ARCHITECTURAL PLANS FOR EXACT LOCATION, LENGTH, AND HEIGHT OF ALL OPENINGS IN CMU WALLS.
- FOR CONTROL JOINT LOCATIONS, SEE ARCHITECTURAL DRAWINGS.
- PROVIDE CMU LINTEL OVER ALL MECHANICAL SYSTEM PENETRATIONS IN CMU WALL. COORDINATE WITH MEP DRAWINGS FOR ALL LOCATIONS.
- 8" CMU WALL IS A NOMINAL DIMENSION, ACTUAL WIDTH IS 7 5/8".



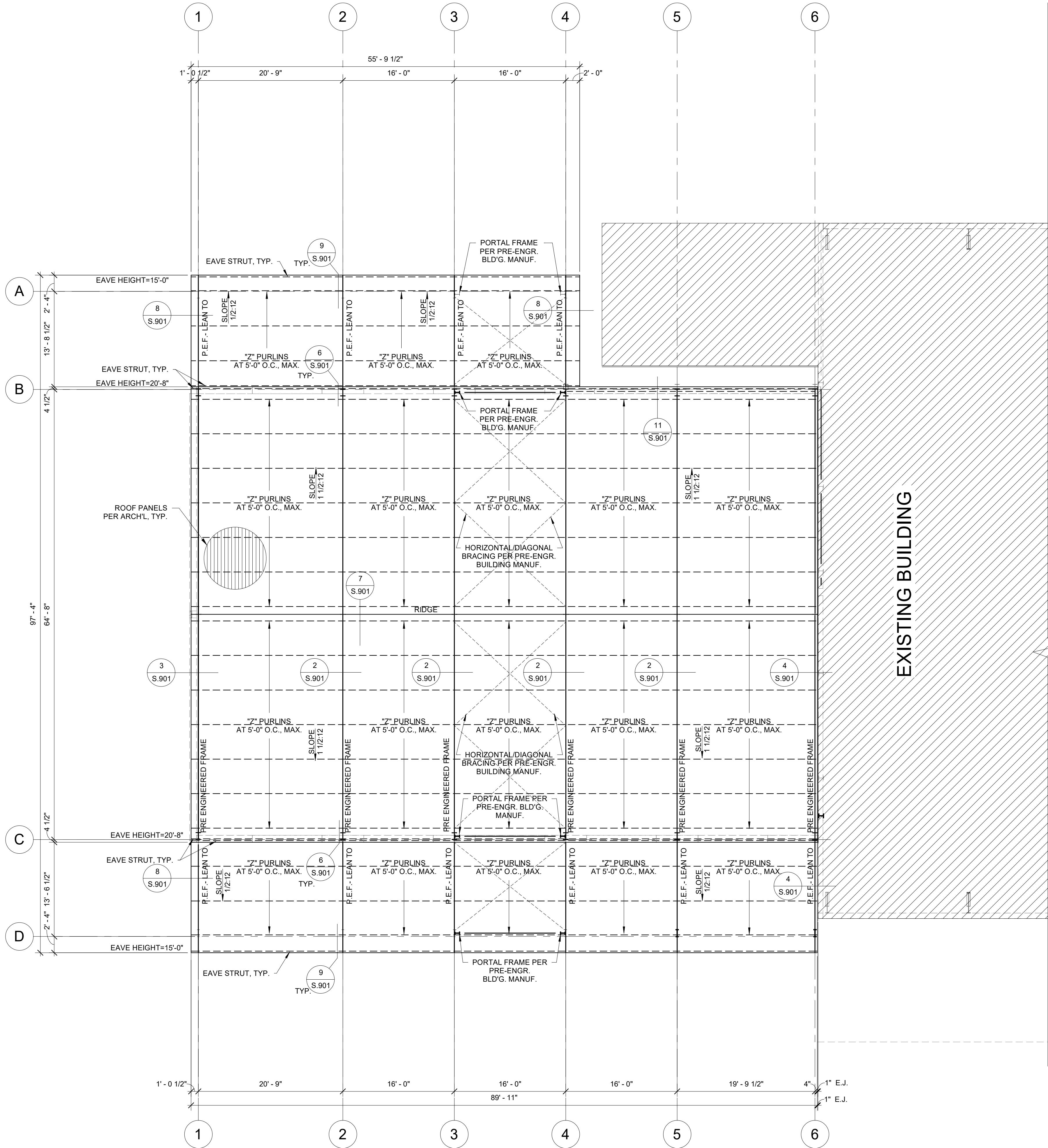
NOTE: CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS BEFORE COMMENCING WORK

NOTE:
THIS IS A RENOVATION PROJECT DONE WITHOUT THE BENEFIT OF ACTUAL AS BUILT DRAWINGS. CERTAIN UNFORESEEN AND UNKNOWN CONDITIONS MAY INCREASE THE COST OF PROJECT. THIS COST SHALL BE COVERED BY OWNER.

NOTE:
CONTRACTOR TO CONTACT STRUCTURAL ENGINEER ONCE EXISTING STRUCTURE IS EXPOSED TO VERIFY STRUCTURAL ASSUMPTIONS AND CONDITIONS.

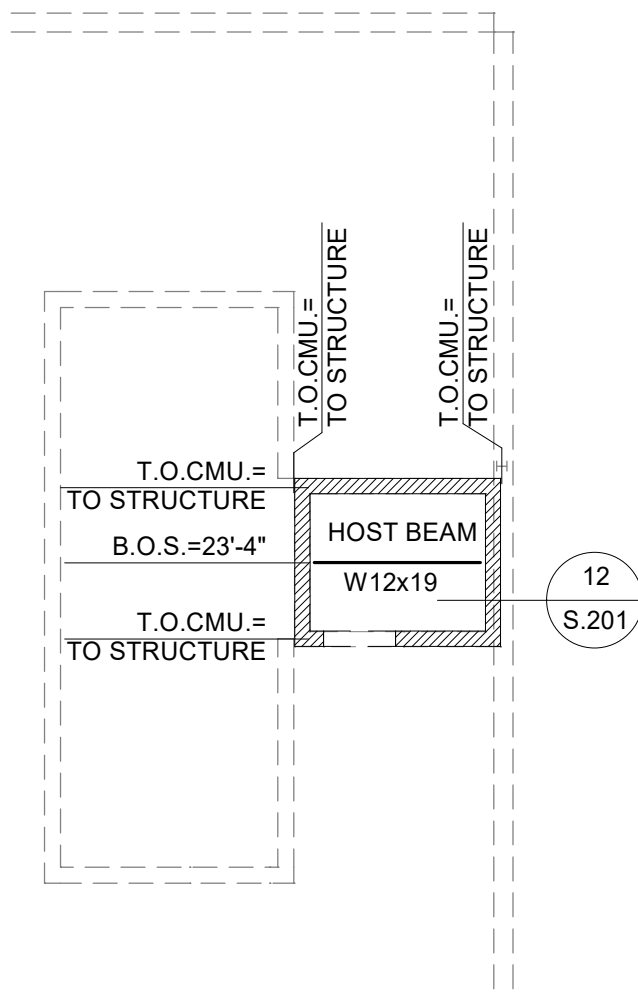
1
S.600
2ND FLOOR FRMAING PLAN
SCALE: 1/8" = 1'-0" REF:

- FRAMING NOTES:
- CONTRACTOR TO VERIFY ALL DIMENSIONS WITH ARCHITECTURAL PLANS AND EXISTING CONDITIONS BEFORE COMMENCING WORK.
 - REFER TO ARCHITECTURAL DRAWINGS FOR ANY ADDITIONAL DIMENSIONS.
 - BUILDING MANUFACTURER TO PROVIDE ADEQUATE BRIDGING FOR ROOF FRAMING AS REQUIRED.
 - CONTRACTOR TO COORDINATE ALL MECHANICAL, ELECTRICAL AND PLUMBING COMPONENTS SUPPORTED BY THE STRUCTURE WITH THE STRUCTURE MANUFACTURER. THIS INCLUDES COORDINATING EXACT WEIGHT AND LOCATION, AND ALL NECESSARY ATTACHMENTS.
 - CONTRACTOR TO COORDINATE EXACT LOCATION AND SIZE OF ANY AND ALL ROOF HATCHES WITH ARCH'L DRAWINGS.
 - STEEL FABRICATOR TO COORDINATE EXACT PURLIN SPACING. STEEL PURLIN LOCATIONS SHOWN ON STRUCTURAL DRAWINGS MAY BE ADJUSTED IN ORDER TO AVOID CONFLICTING STRUCTURAL MEMBERS AND CONDITIONS (SUCH AS STUB COLUMNS OR CONNECTIONS) AND IN ORDER TO ACHIEVE PROPER BEARING. ADD PURLIN AS NEEDED TO NOT EXCEED MAXIMUM SPACING SHOWN ON DRAWINGS.



FRAMING NOTES:

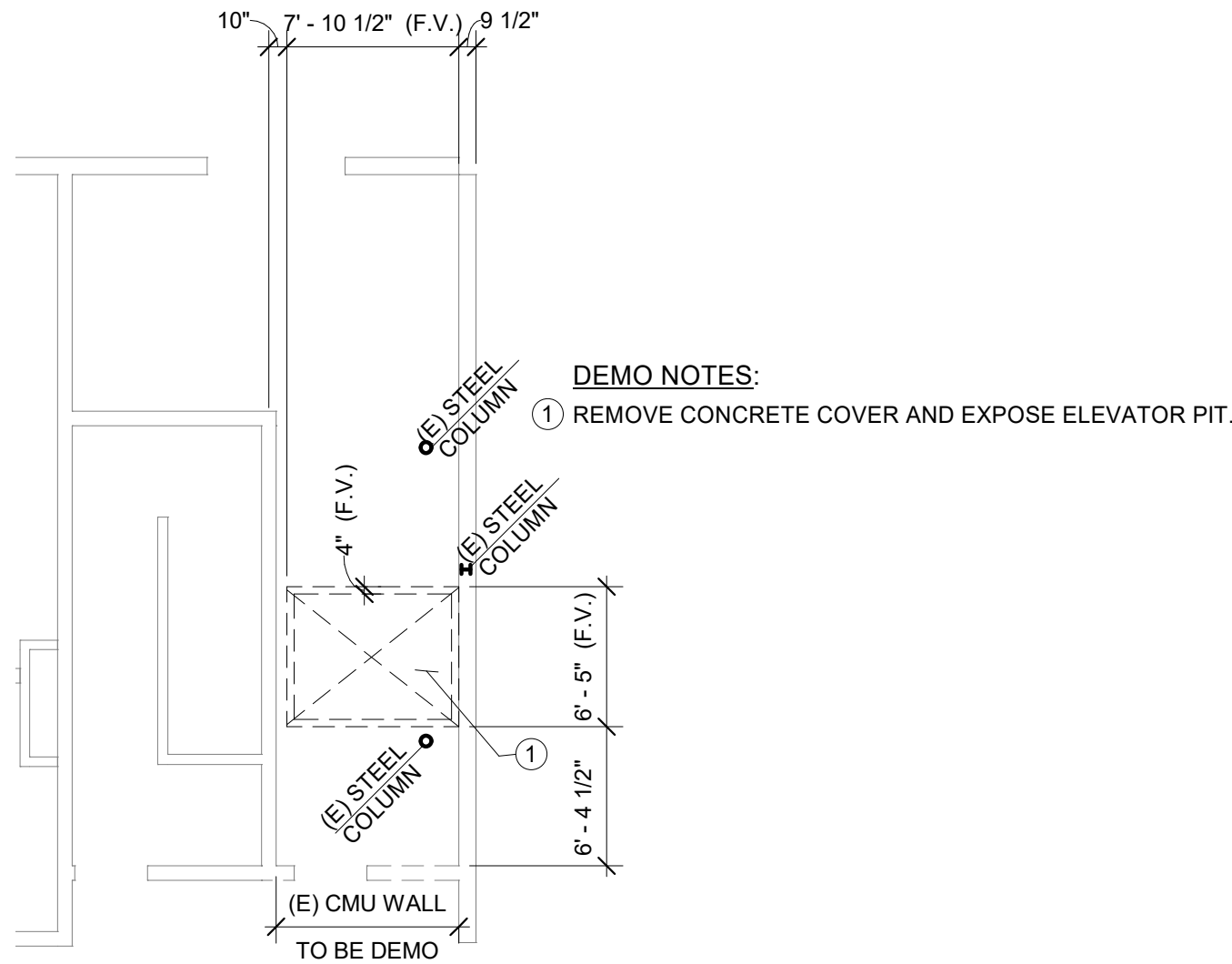
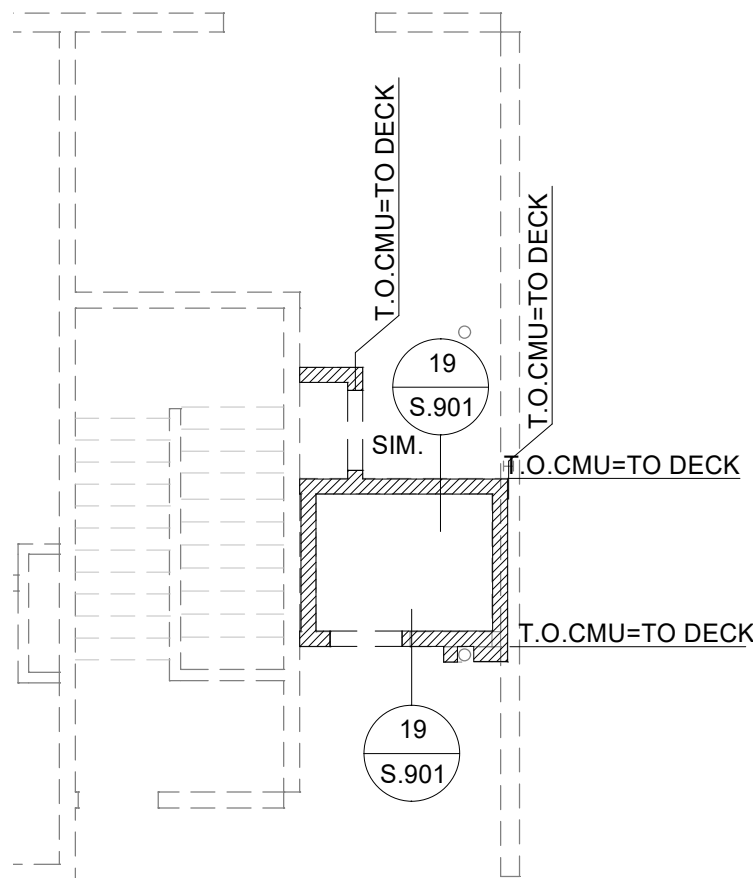
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2. REFER TO ARCHITECTURAL DRAWINGS FOR ANY ADDITIONAL DIMENSIONS.
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5. CONTRACTOR TO COORDINATE EXACT LOCATION AND SIZE OF ANY AND ALL ROOF HATCHES WITH ARCH'L DRAWINGS.
6. STEEL FABRICATOR TO COORDINATE EXACT PURLIN SPACING. STEEL PURLIN LOCATIONS SHOWN ON STRUCTURAL DRAWINGS MAY BE ADJUSTED IN ORDER TO AVOID CONFLICTING STRUCTURAL MEMBERS AND CONDITIONS (SUCH AS STUB COLUMNS OR CONNECTIONS) AND IN ORDER TO ACHIEVE PROPER BEARING. ADD PURLIN AS NEEDED TO NOT EXCEED MAXIMUM SPACING SHOWN ON DRAWINGS.



NOTE: COORDINATE ELEVATOR CLEANCE
REQUIREMENTS PRIOR TO HOIST BEAM PLACEMENT.

CMU WALL LAYOUT NOTES:

1. IF ANY DISCREPANCIES ARE FOUND BETWEEN THESE DRAWINGS AND THE ARCHITECTURAL DRAWINGS THE CONTRACTOR SHALL NOTIFY THE ARCHITECT AND ENGINEER BEFORE COMMENCING CONSTRUCTION.
2. FOR TYPICAL CMU WALL CONSTRUCTION SEE SHEET S.201
3. FOR TYPICAL ATTACHMENT AT THE TOP OF ALL INTERIOR CMU WALLS (INCLUDING THOSE NOT SHOWN ON THIS PLAN) SEE DETAILS 14,15/S.201
4. [Pattern] INDICATES EXTERIOR 8" CMU WALL WITH #6 (V) AT 32" O.C. AND #5 (H) AT 8'-0" O.C., U.N.O.
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6. [Pattern] INDICATES CMU LINTEL, SEE DETAIL 7/S.201
7. FOR SPECIAL INSPECTION REQUIREMENTS SEE GENERAL NOTES.
8. ALL TOP OF WALLS FROM FINISH FLOOR ELEVATION 0'-0".
9. SEE ARCHITECTURAL PLANS FOR EXACT LOCATION, LENGTH, AND HEIGHT OF ALL OPENINGS IN CMU WALLS.
10. FOR CONTROL JOINT LOCATIONS, SEE ARCHITECTURAL DRAWINGS.
11. PROVIDE CMU LINTEL OVER ALL MECHANICAL SYSTEM PENETRATIONS IN CMU WALL. COORDINATE WITH MEP DRAWINGS FOR ALL LOCATIONS.
12. 8" CMU WALL IS A NOMINAL DIMENSION, ACTUAL WIDTH IS 7 5/8".



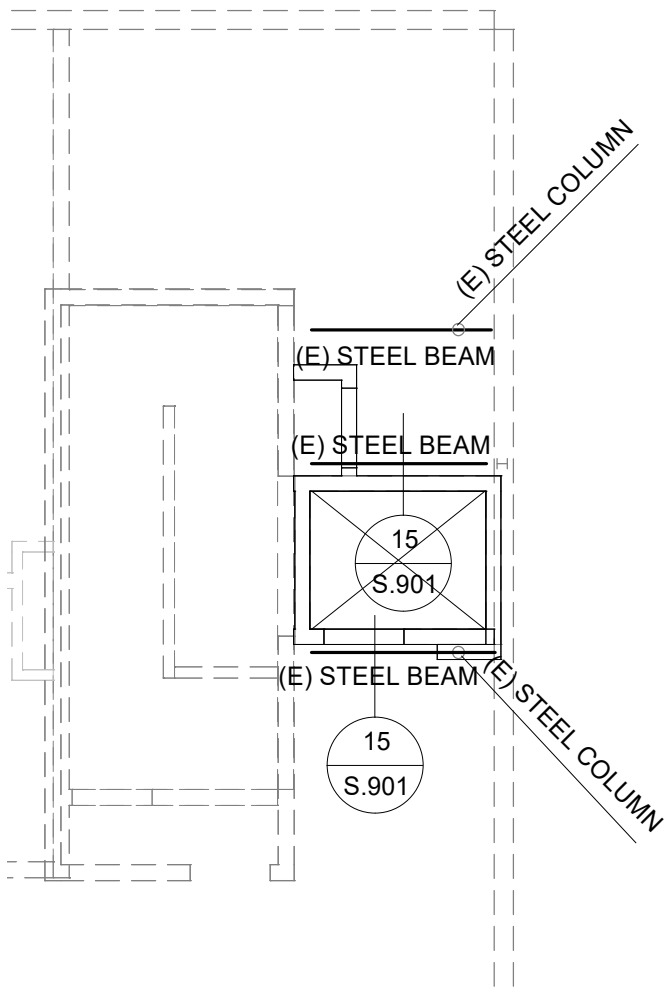
DEMO NOTES:

- 1 REMOVE CONCRETE COVER AND EXPOSE ELEVATOR PIT.

5 2nd FLOOR WALL LAYOUT PLAN - ELEVATOR ALT#1
S.800 SCALE: 1/8" = 1'-0" REF:

3 WALL LAYOUT PLAN- ELEVATOR ALT#1
S.800 SCALE: 1/8" = 1'-0" REF: S.500

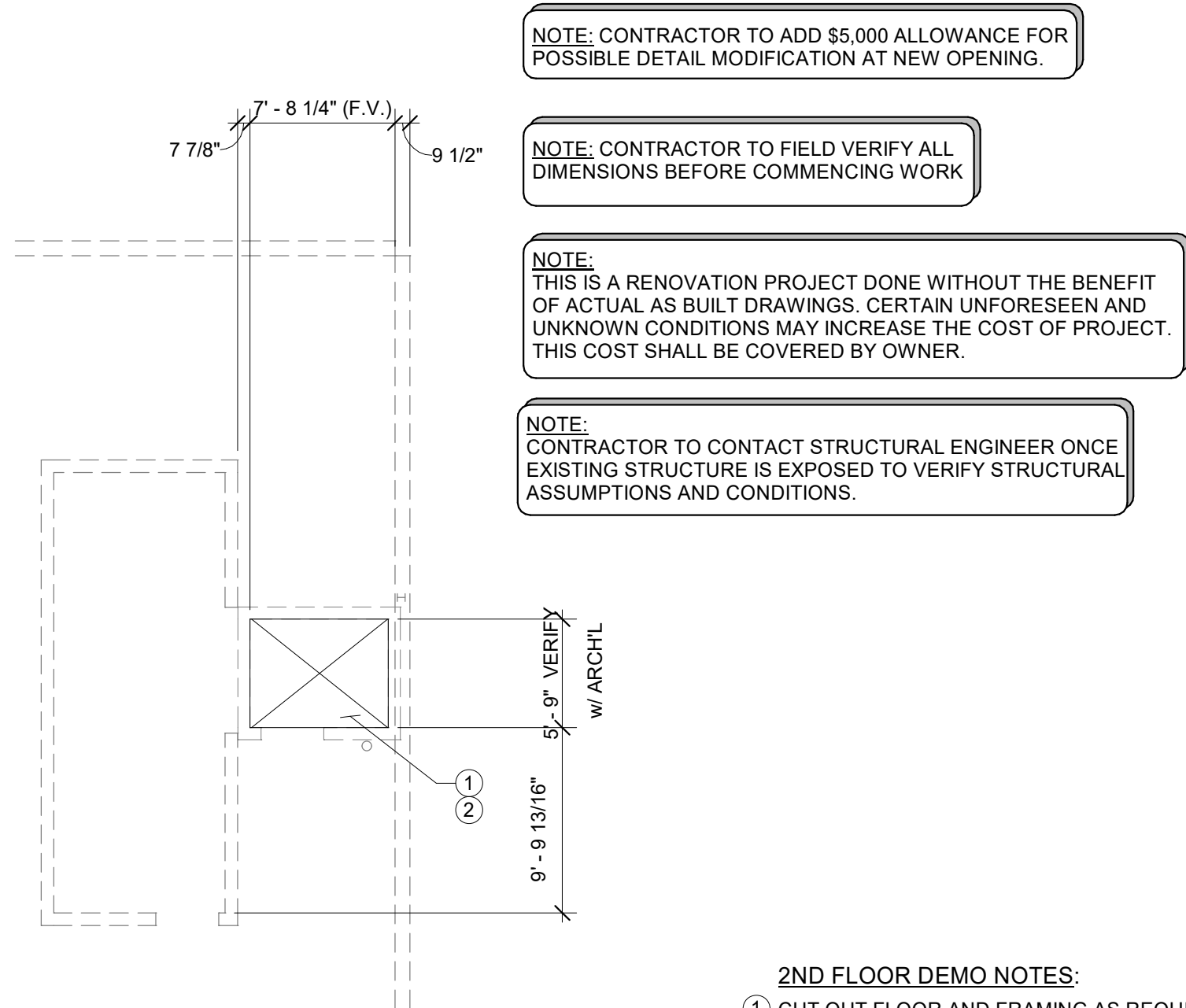
1 DEMO PLAN-ELEVATOR ALT#1
S.800 SCALE: 1/8" = 1'-0" REF: S.300



FRAMING NOTES:

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2. REFER TO ARCHITECTURAL DRAWINGS FOR ANY ADDITIONAL DIMENSIONS.
3. BUILDING MANUFACTURER TO PROVIDE ADEQUATE BRIDGING FOR ROOF FRAMING AS REQUIRED.
4. CONTRACTOR TO COORDINATE ALL MECHANICAL, ELECTRICAL AND PLUMBING COMPONENTS SUPPORTED BY THE STRUCTURE WITH THE STRUCTURE MANUFACTURER. THIS INCLUDES COORDINATING EXACT WEIGHT AND LOCATION, AND ALL NECESSARY ATTACHMENTS.
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4 2ND FLOOR FRMAING PLAN-ELEVATOR ALT#1
S.800 SCALE: 1/8" = 1'-0" REF: S.600



NOTE: CONTRACTOR TO ADD \$5,000 ALLOWANCE FOR
POSSIBLE DETAIL MODIFICATION AT NEW OPENING.

NOTE: CONTRACTOR TO FIELD VERIFY ALL
DIMENSIONS BEFORE COMMENCING WORK

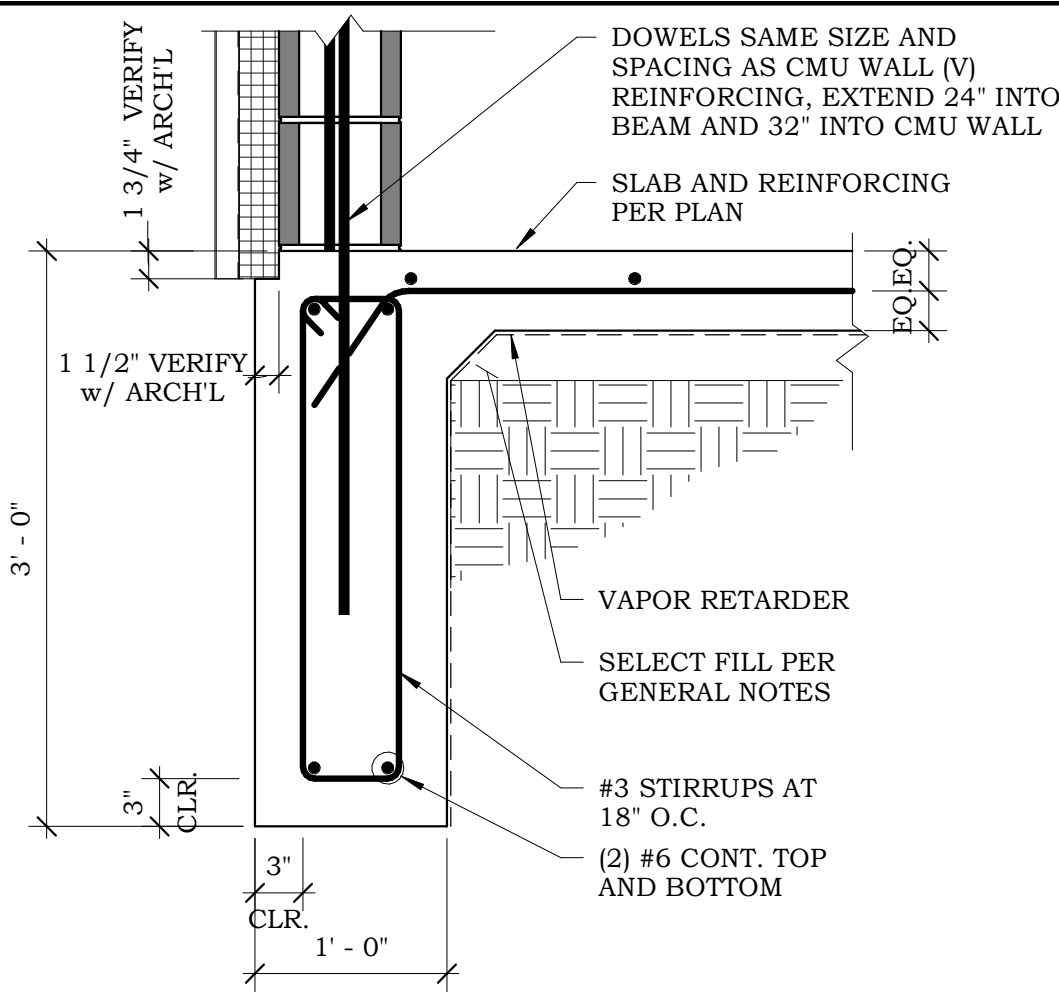
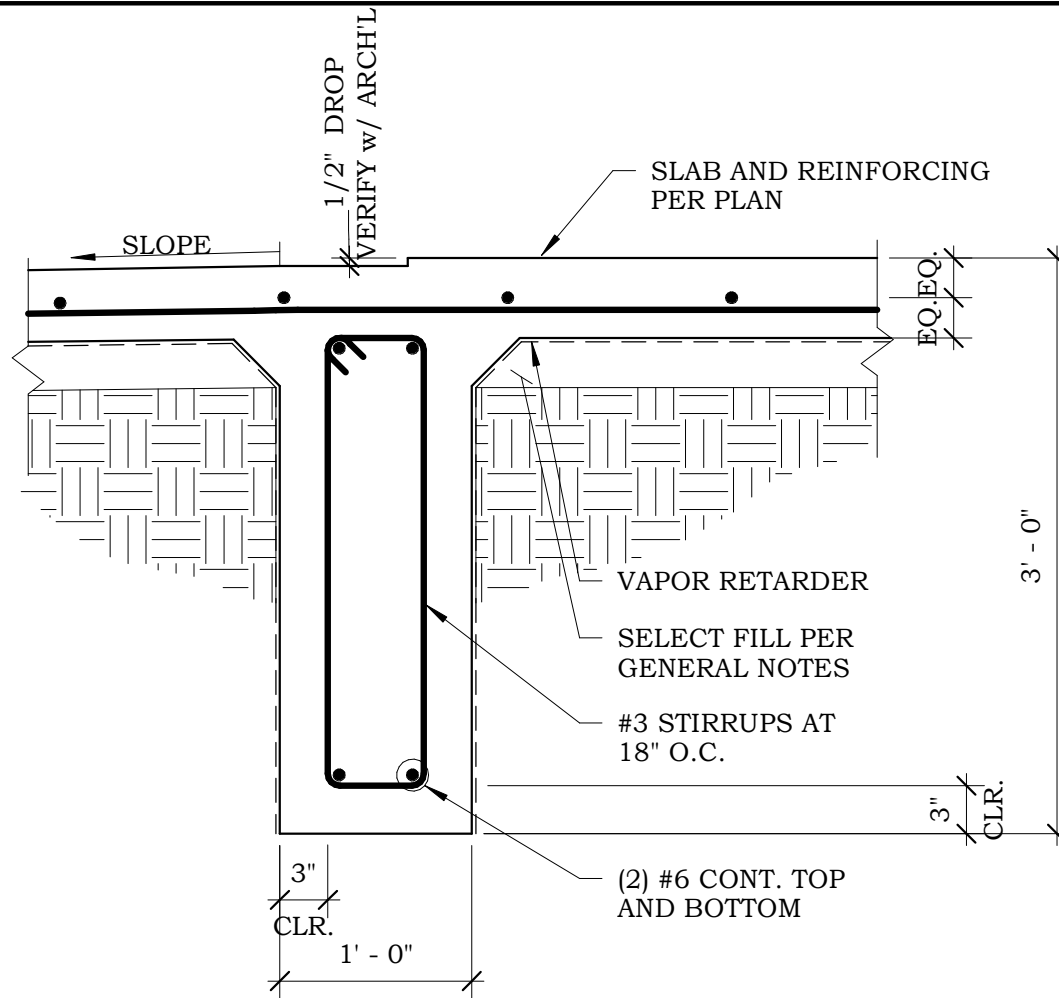
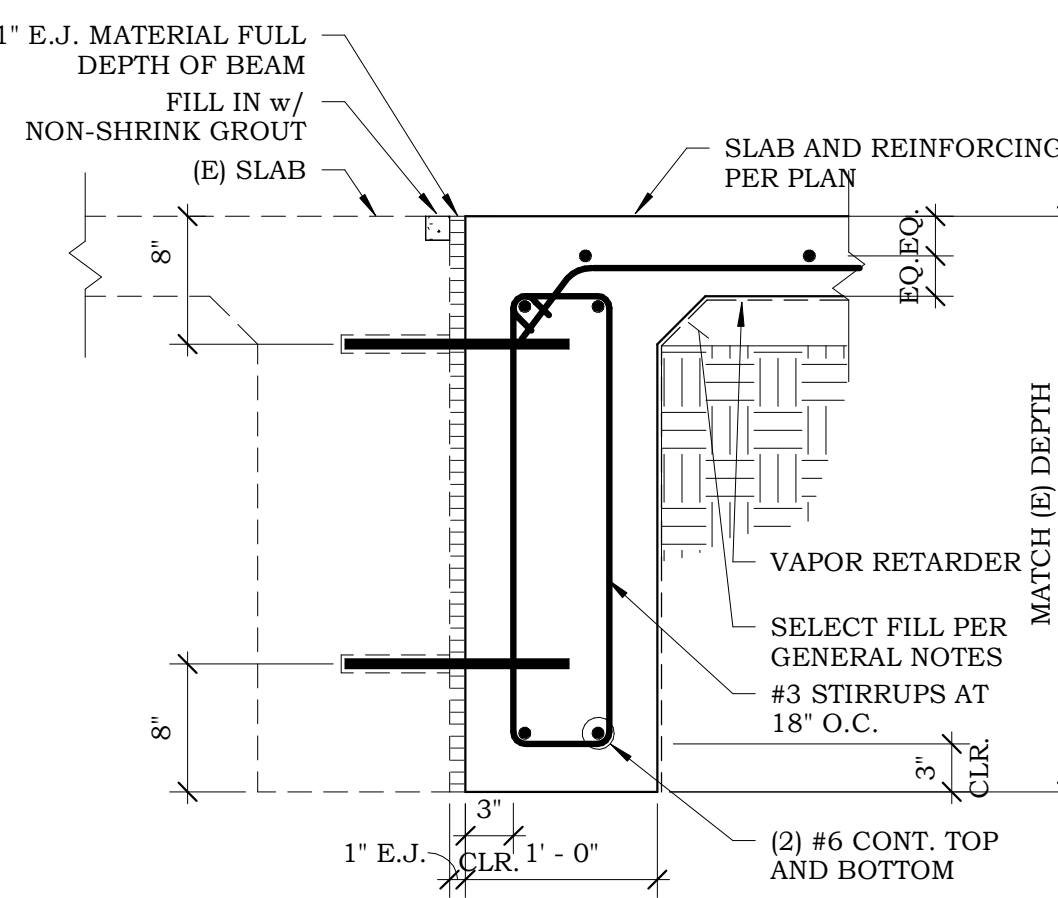
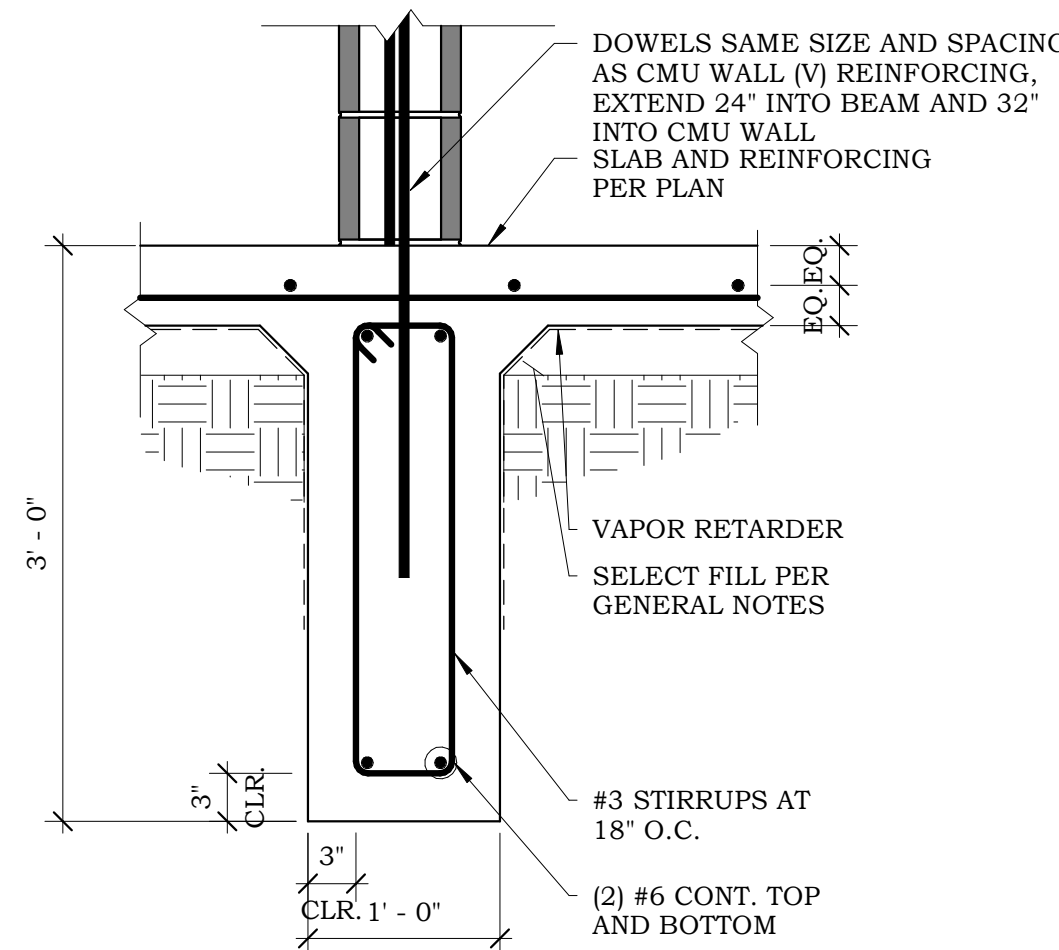
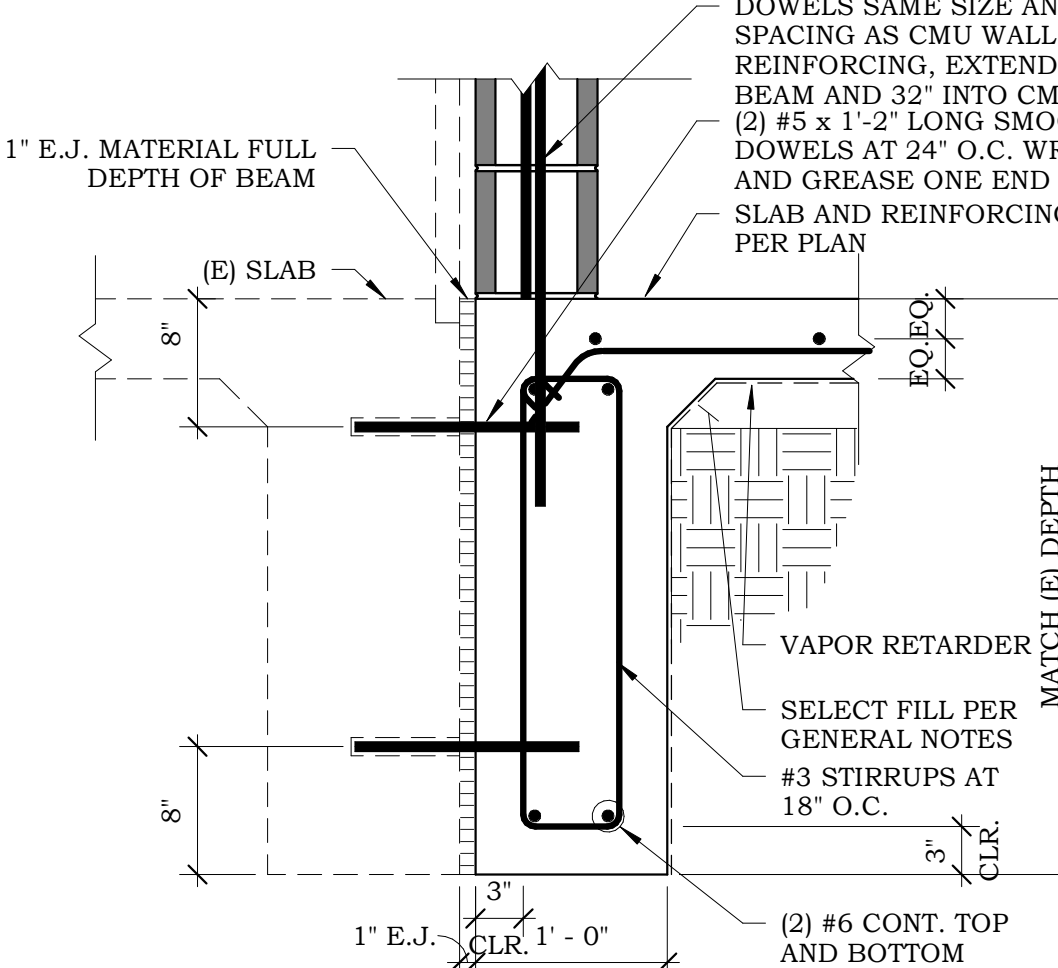
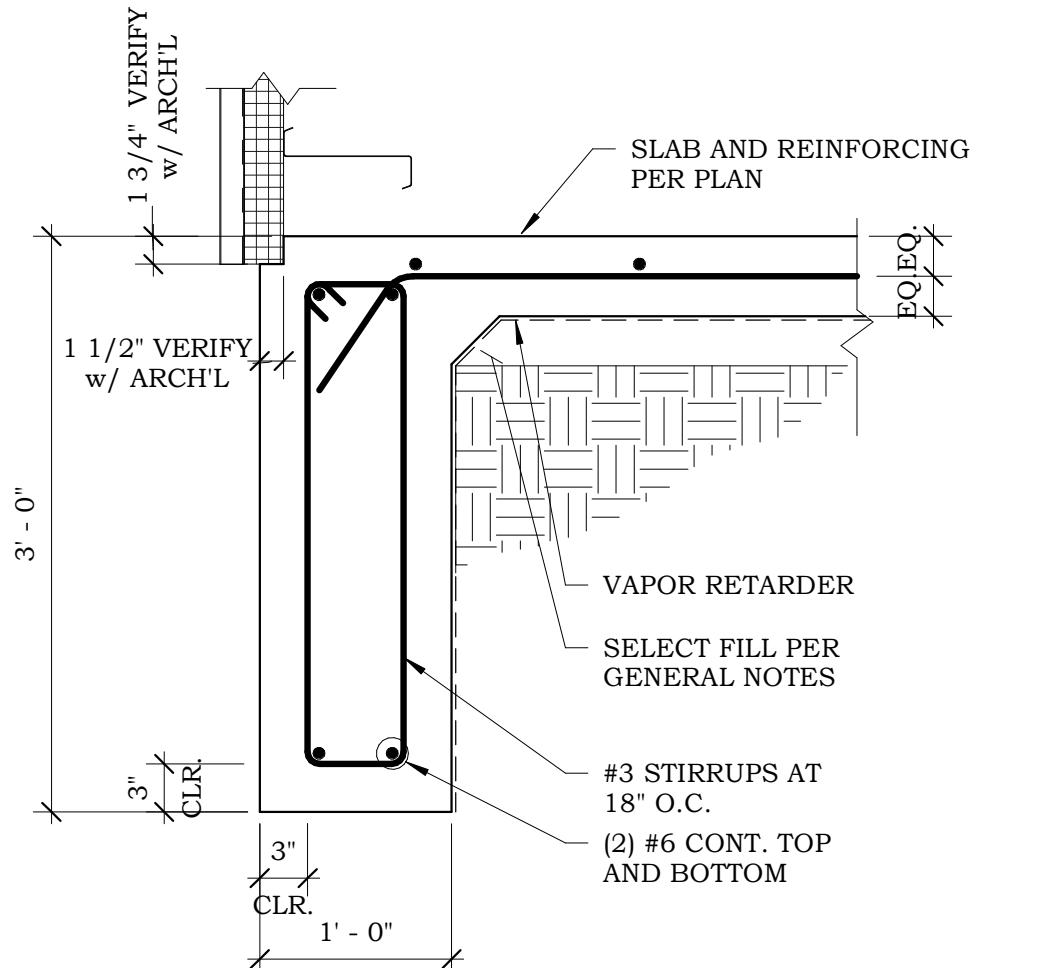
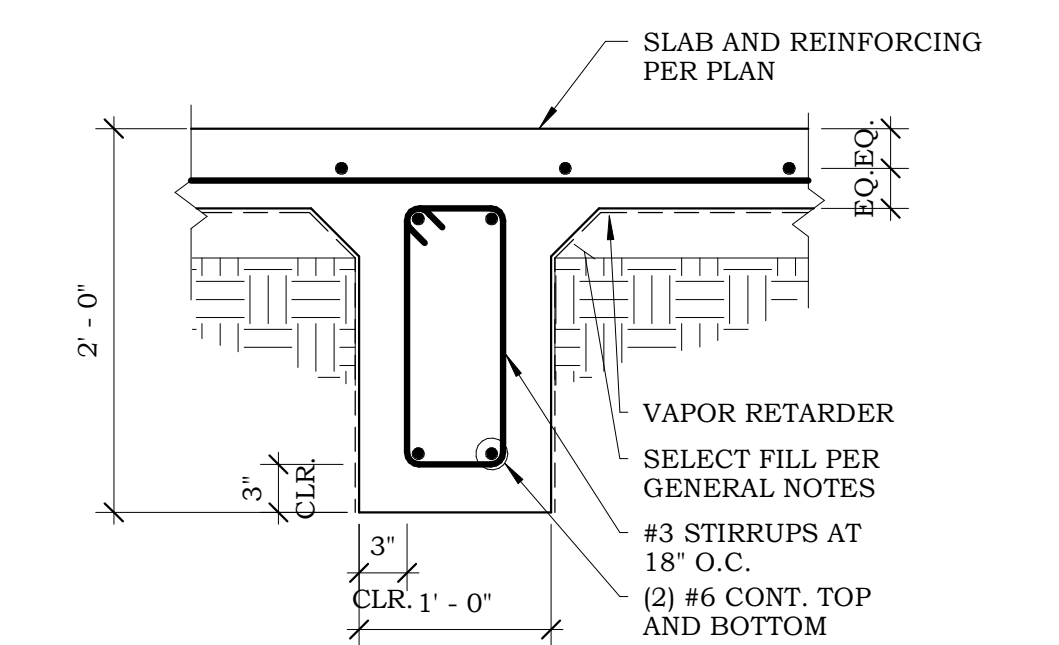
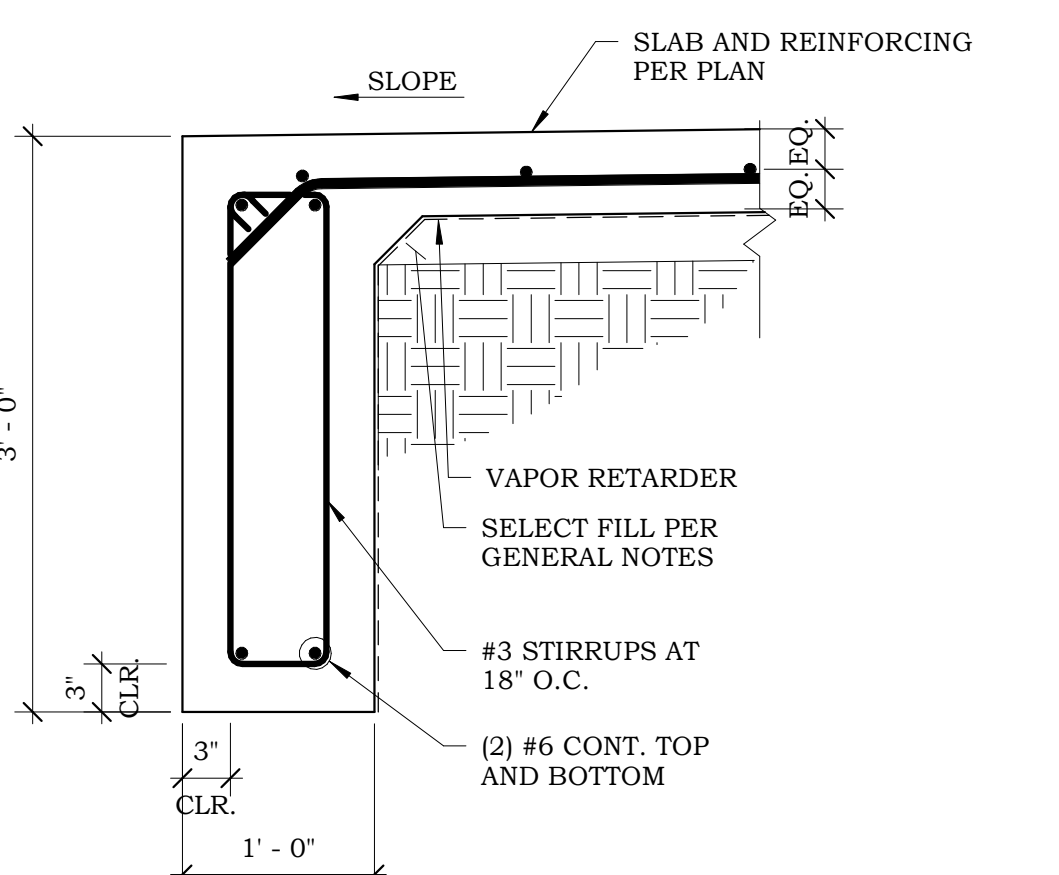
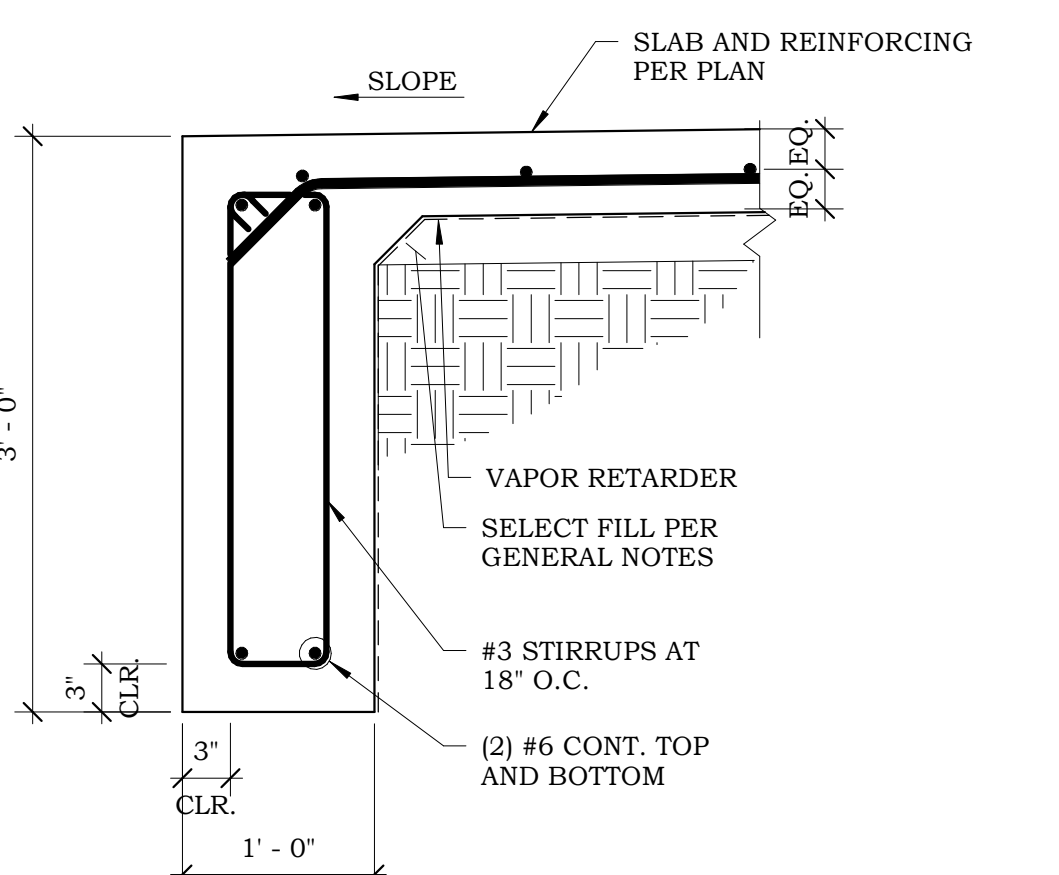
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NOTE:
CONTRACTOR TO CONTACT STRUCTURAL ENGINEER ONCE
EXISTING STRUCTURE IS EXPOSED TO VERIFY STRUCTURAL
ASSUMPTIONS AND CONDITIONS.

2ND FLOOR DEMO NOTES:

- 1 CUT OUT FLOOR AND FRAMING AS REQUIRED FOR
ELEVATOR OPENING.
- 2 CONTRACTOR TO COORDINATE NEW OPENING WITH
E.O.R. PRIOR TO REMOVAL OF FLOOR.

2 2nd FLOOR DEMO PLAN
S.800 SCALE: 1/8" = 1'-0" REF:

									
NOT USED	17	NOT USED	13	EXTERIOR GRADE BEAM	9	EXTERIOR GRADE BEAM	5	NOT USED	
									
NOT USED	18	NOT USED	14	NOT USED	10	EXPANSION JOINT DETAIL	6	EXTERIOR GRADE BEAM	
									
NOT USED	19	NOT USED	15	NOT USED	11	INTERIOR GRADE BEAM	7	INTERIOR GRADE BEAM	
									
NOT USED	20	NOT USED	16	NOT USED	12	EXPANSION JOINT DETAIL	8	EXTERIOR GRADE BEAM	
									
									
									
									
									

CHANIN

ENGINEERING, LLC

400 Nolana, Suite H2

McAllen, Texas 78504

PH: (956) 687-9421 FAX: (956) 687-3211

www.chaninengineering.com

TBPE FIRM REG. NUMBER F-9369

11720 NORTH IH35
AUSTIN, TEXAS 78753
PH: 512.474.6526
FAX: 512.474.6761

204 E. STUBBS
STREET
EDINBURG, TX
PH: 281.384.0611
FAX: 281.384.0613

NEGRETE & KOLAR

ARCHITECTS

LLP

WWW.NEKOARCH.COM

STATE OF TEXAS

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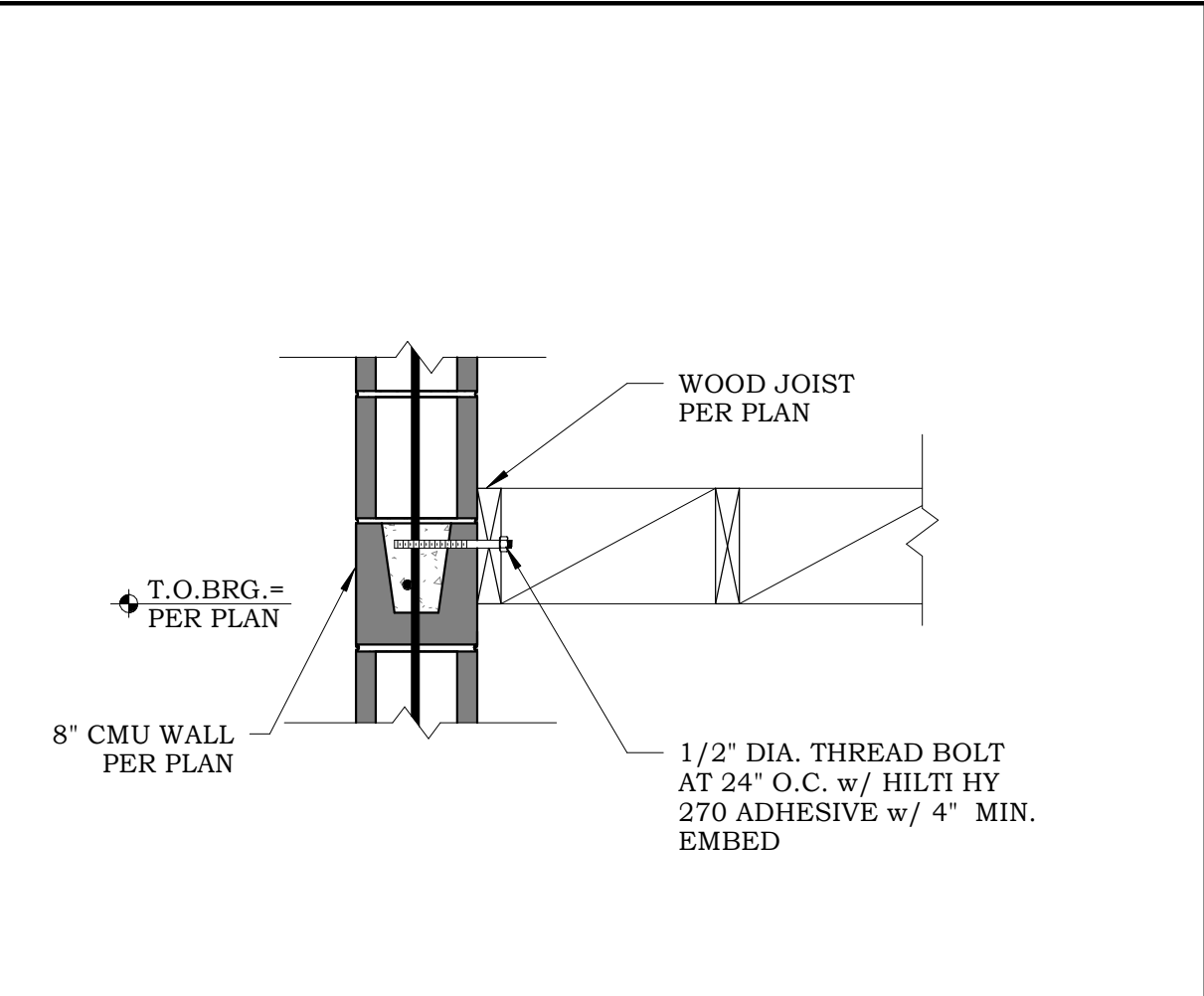
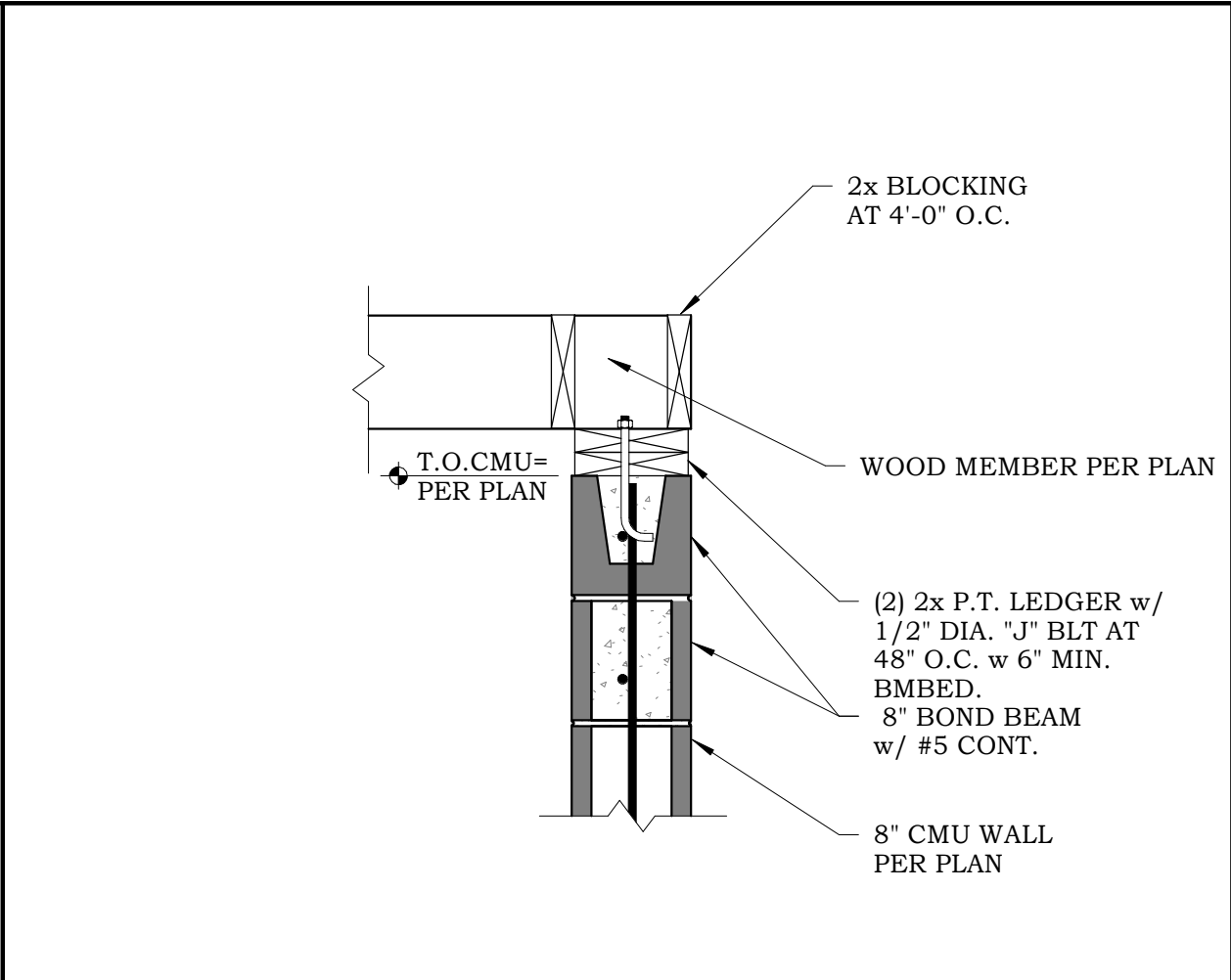
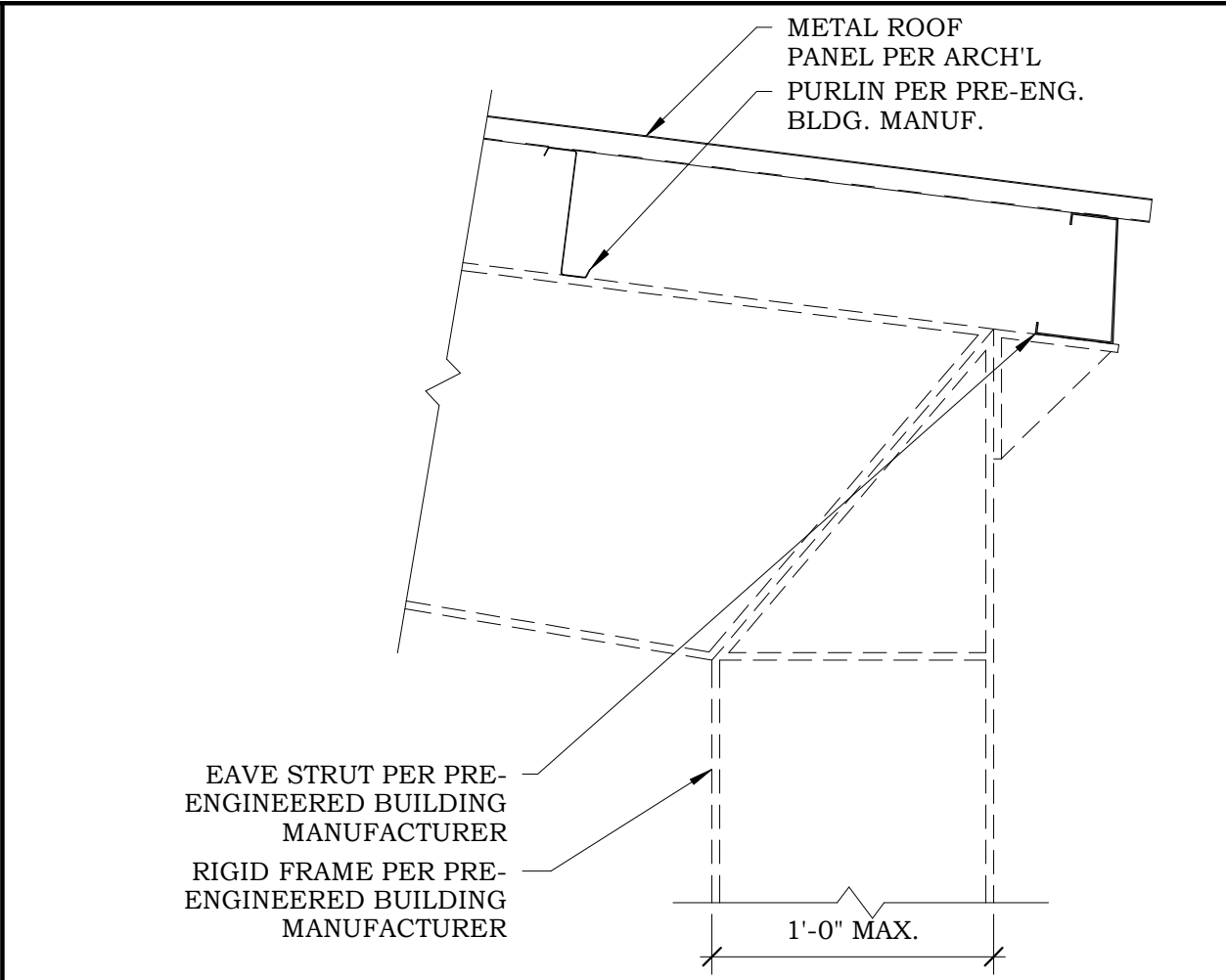
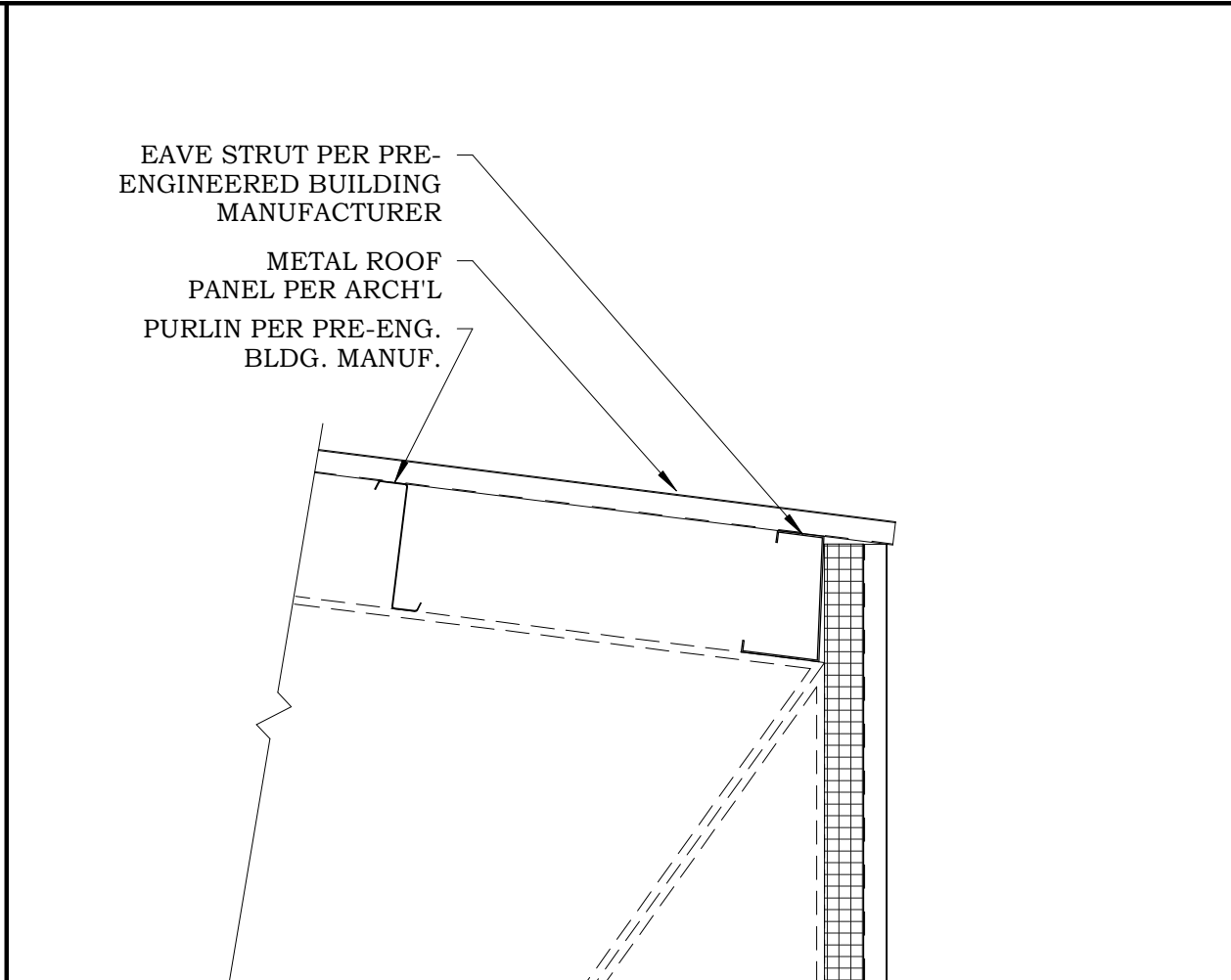
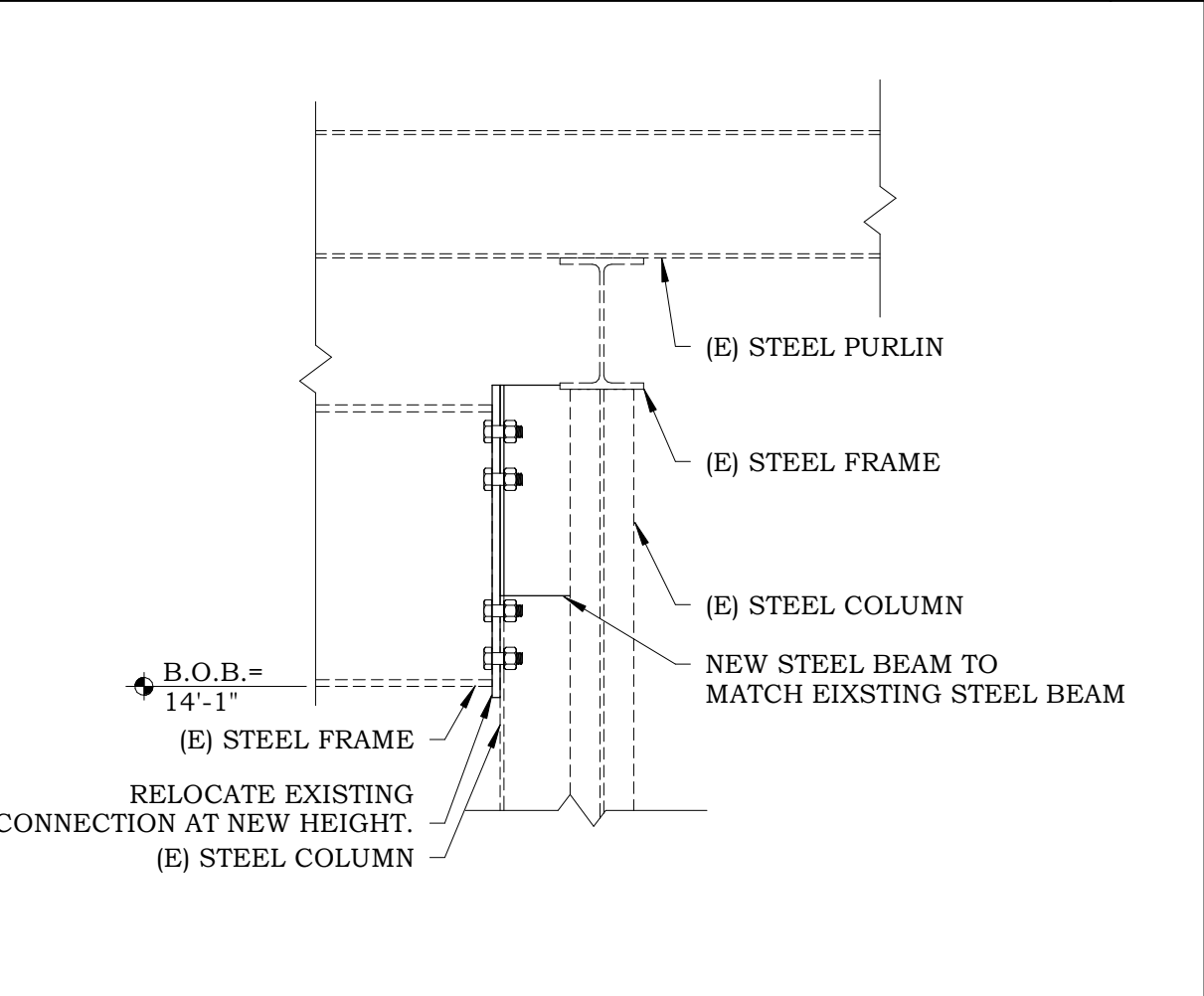
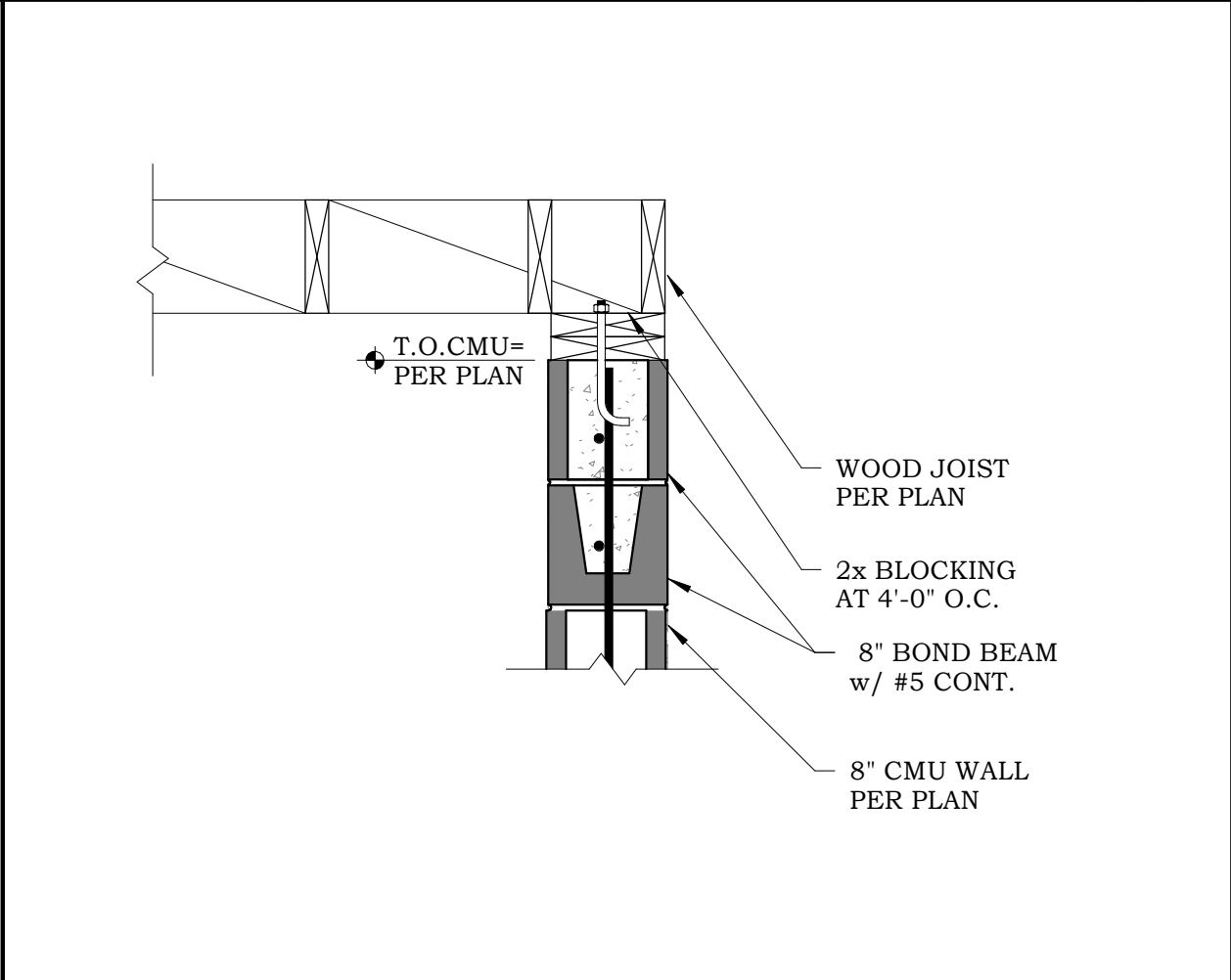
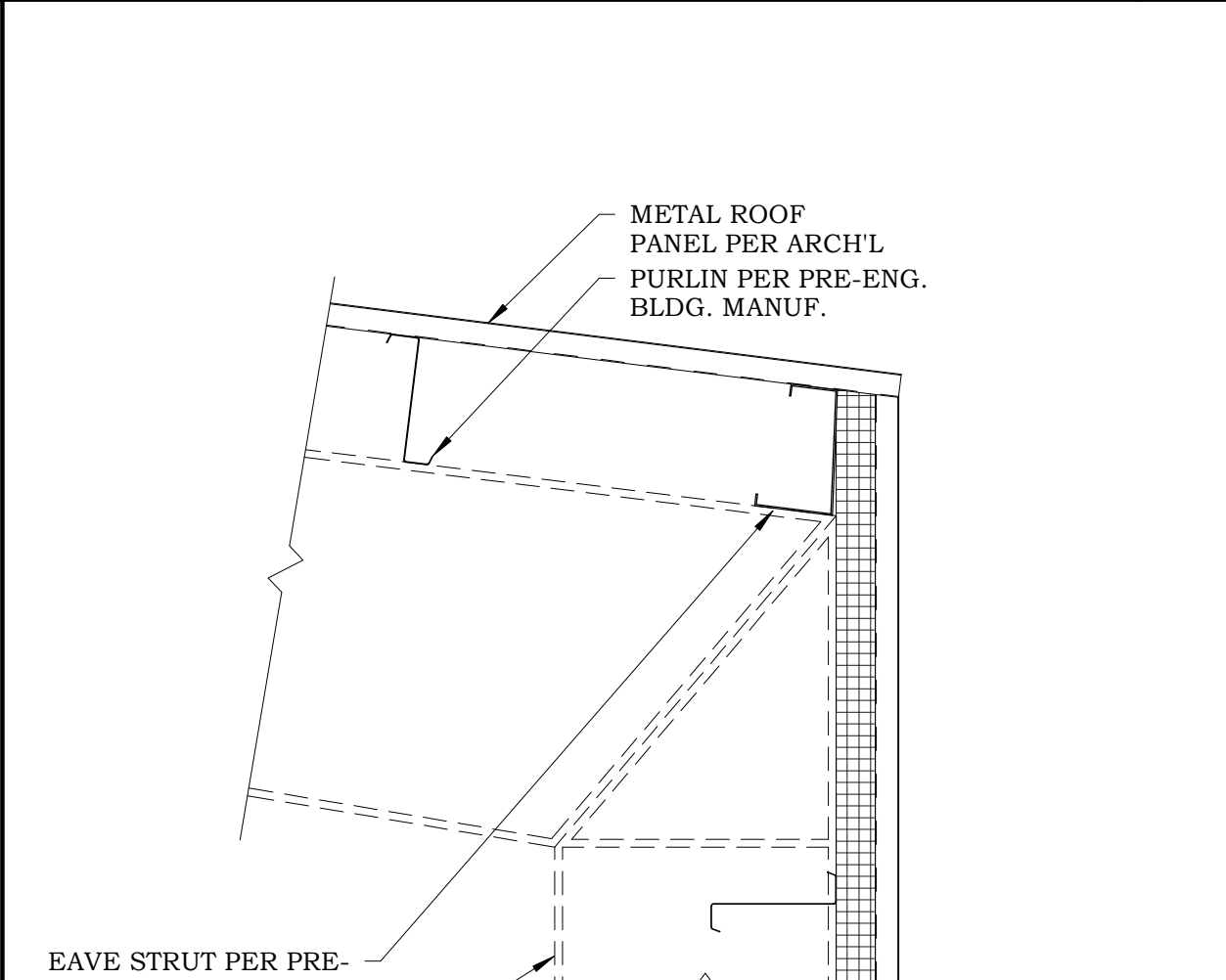
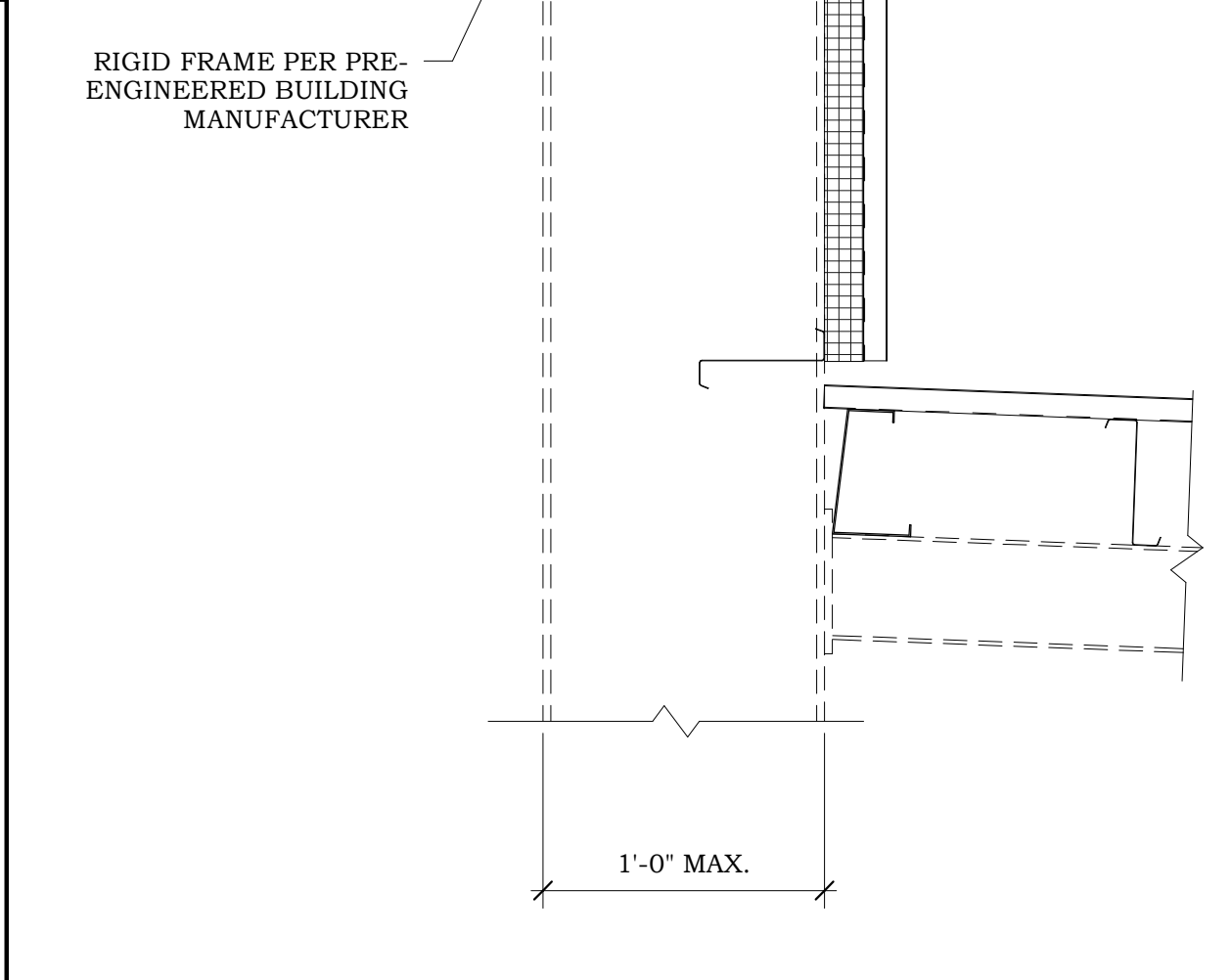
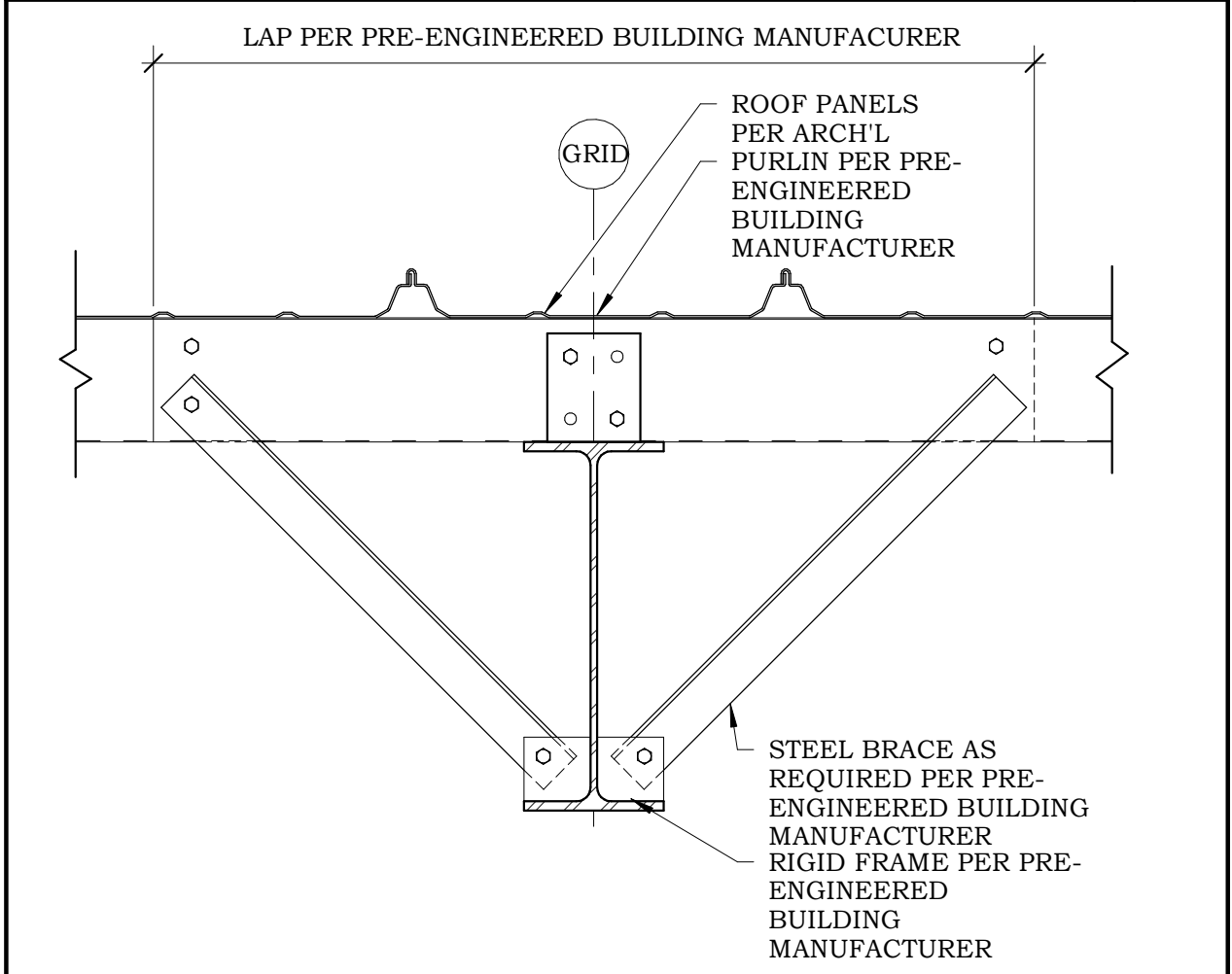
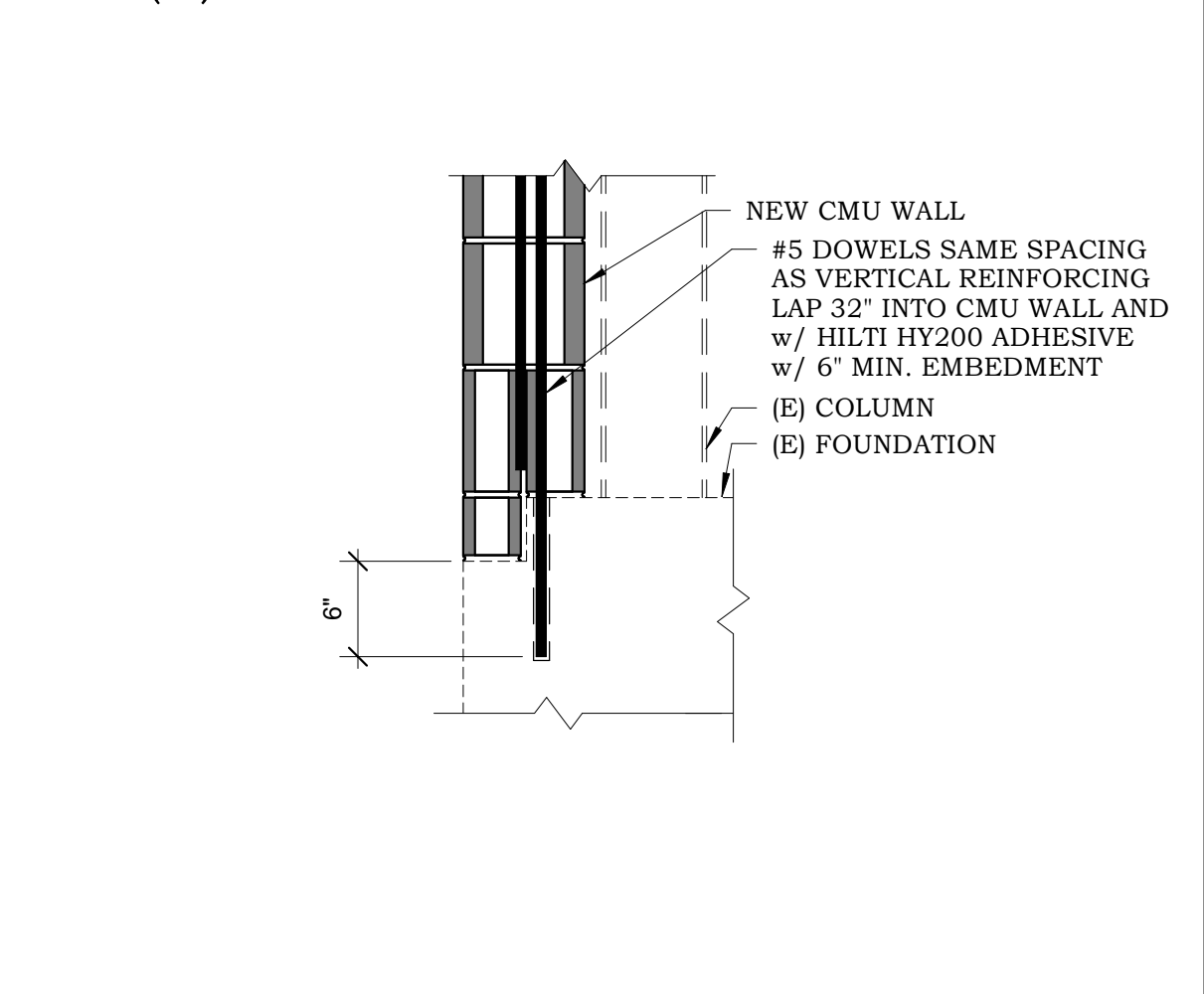
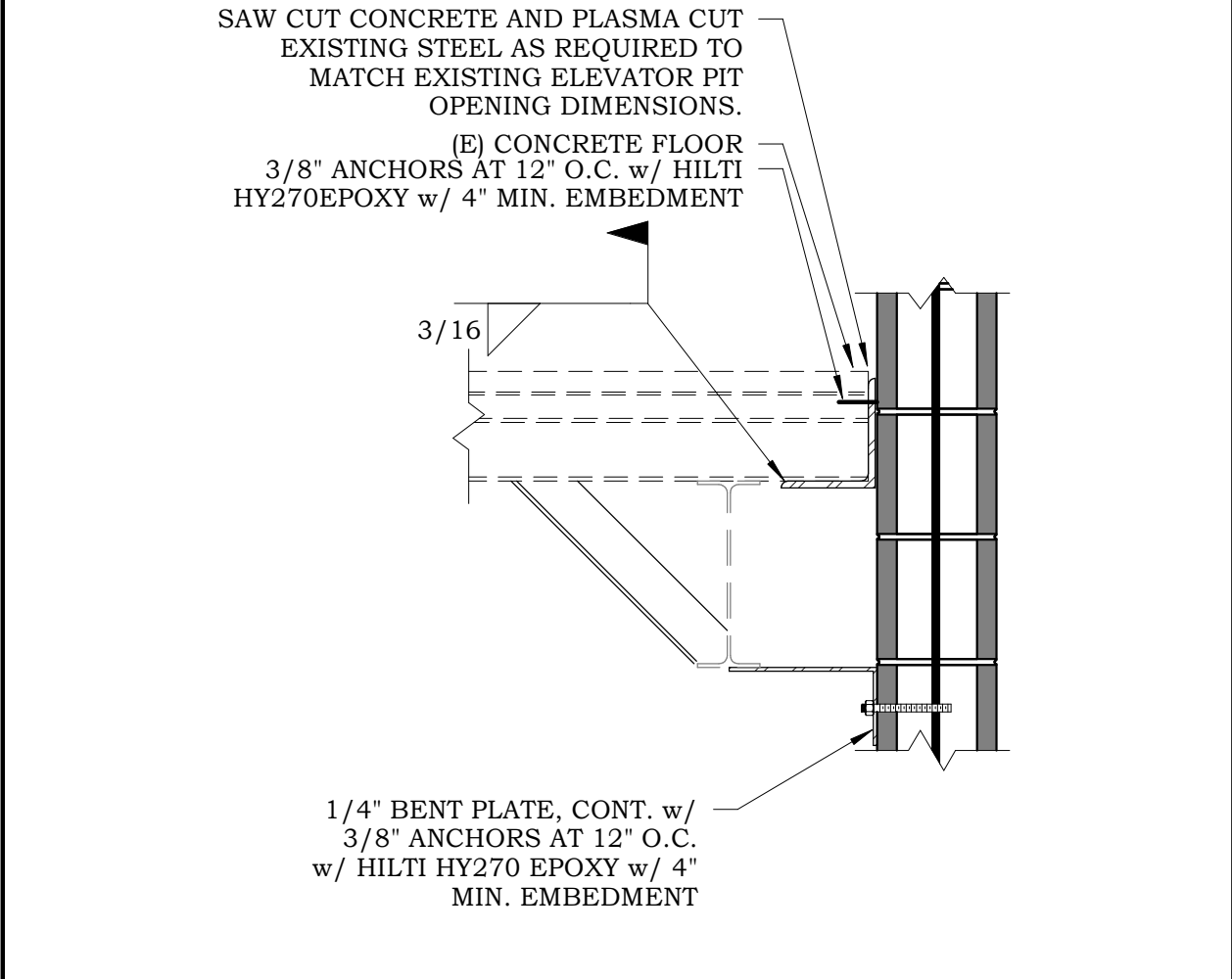
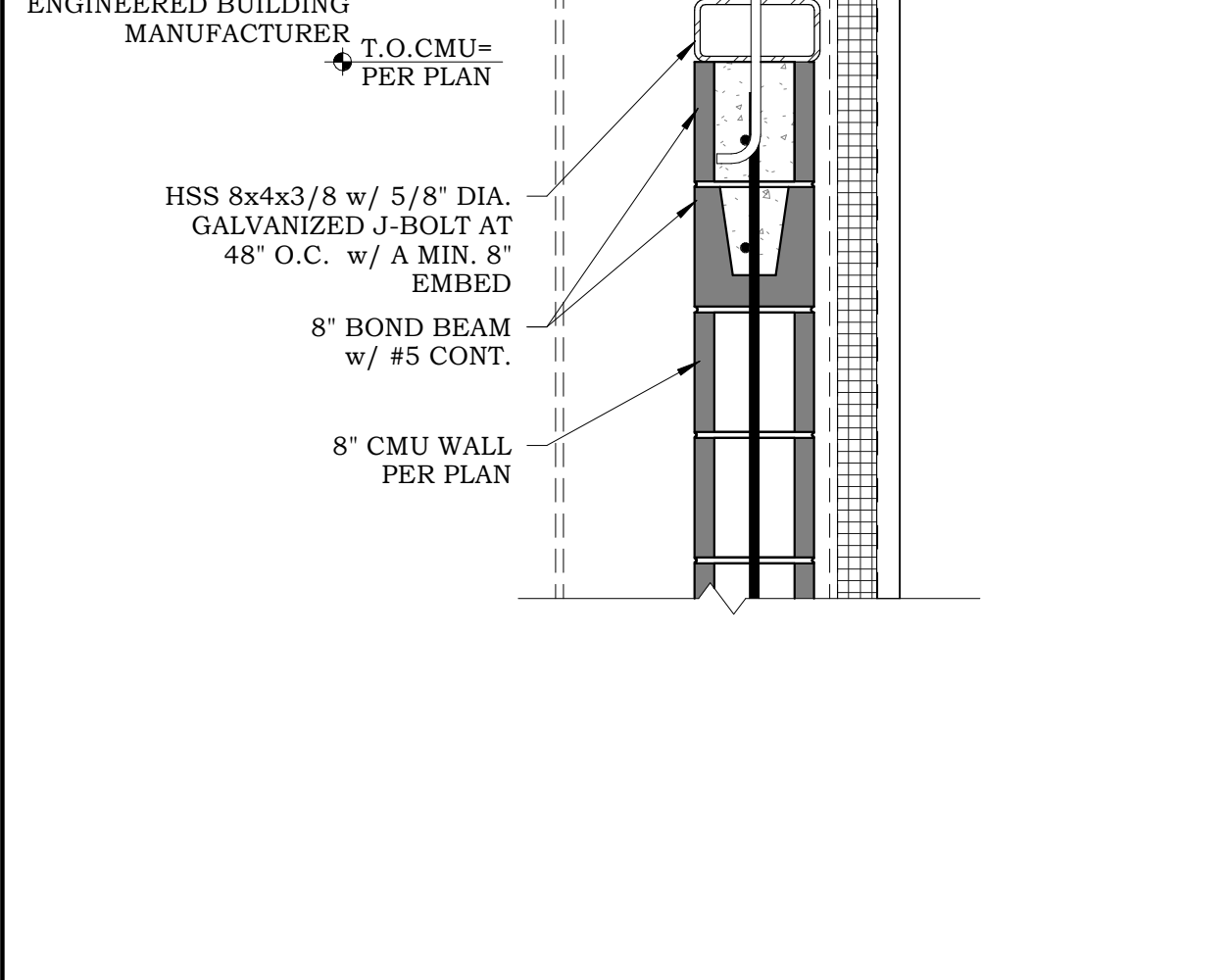
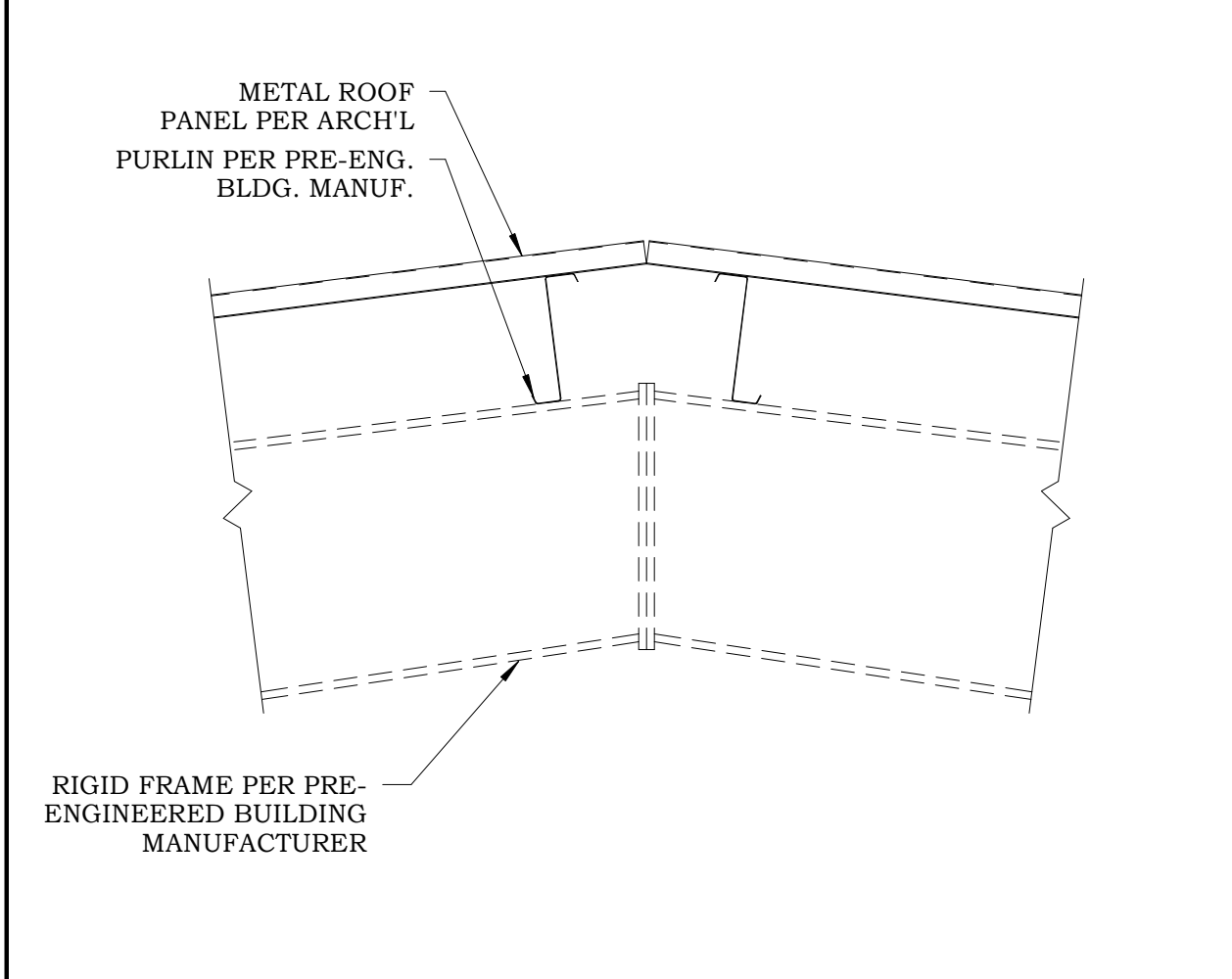
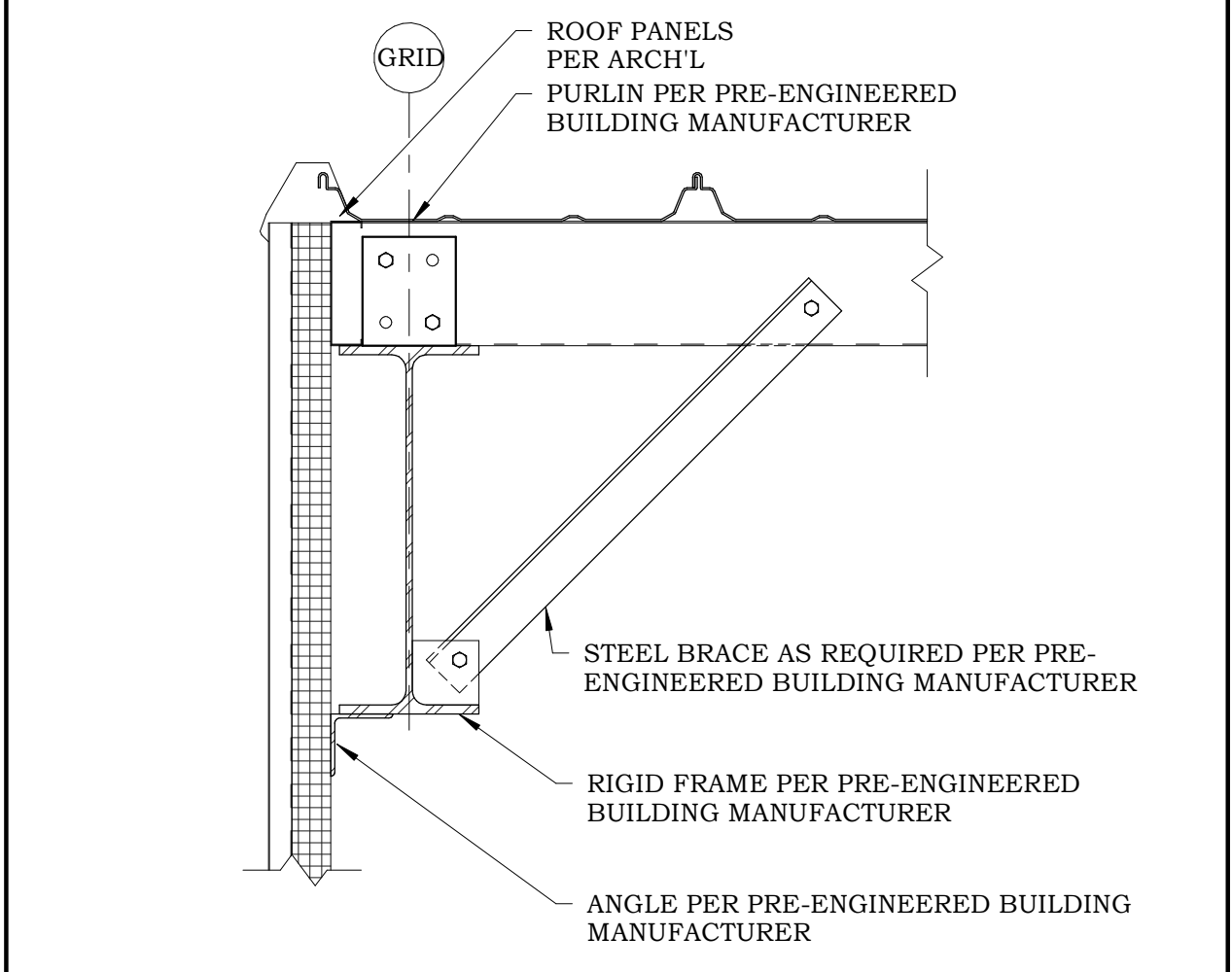


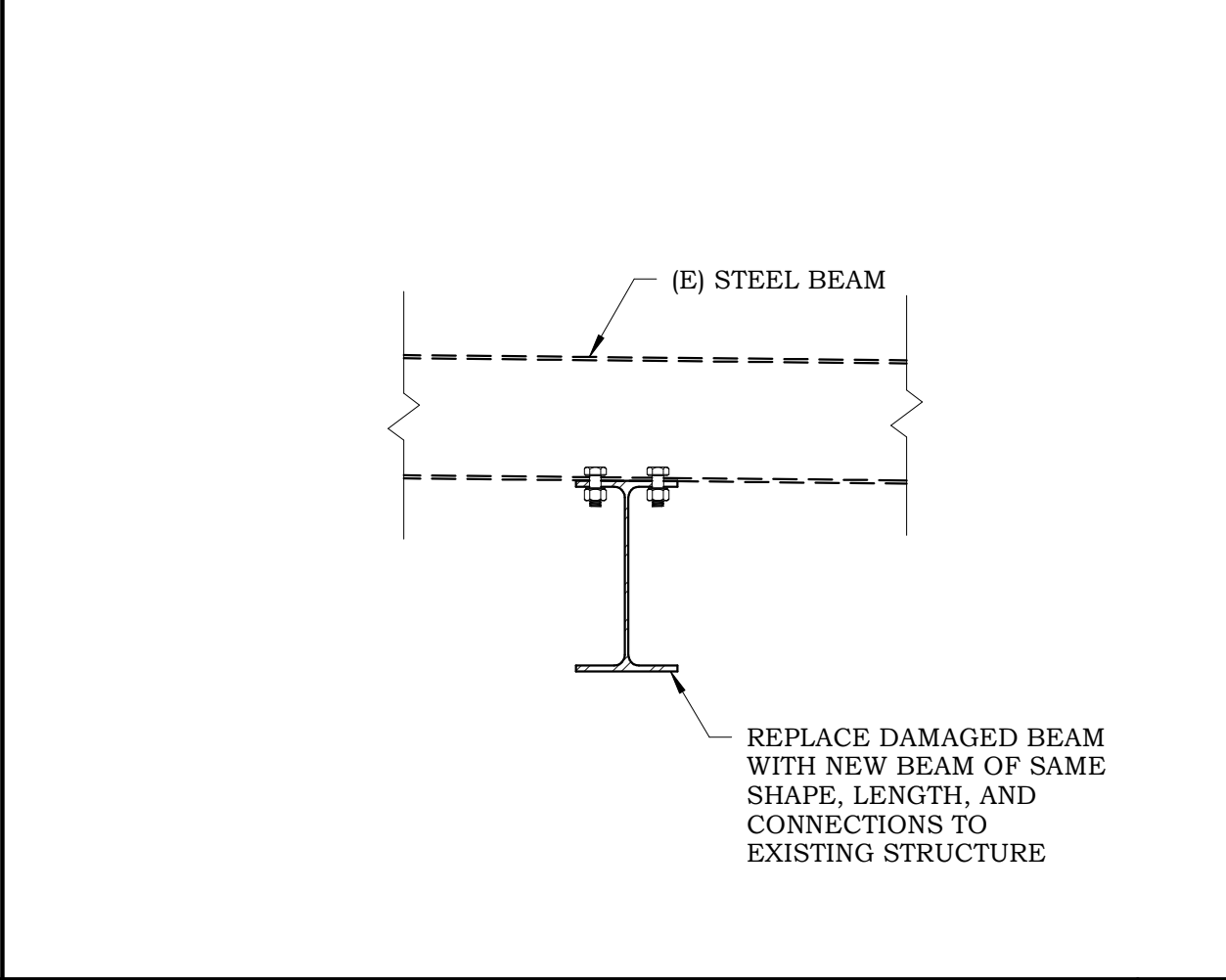
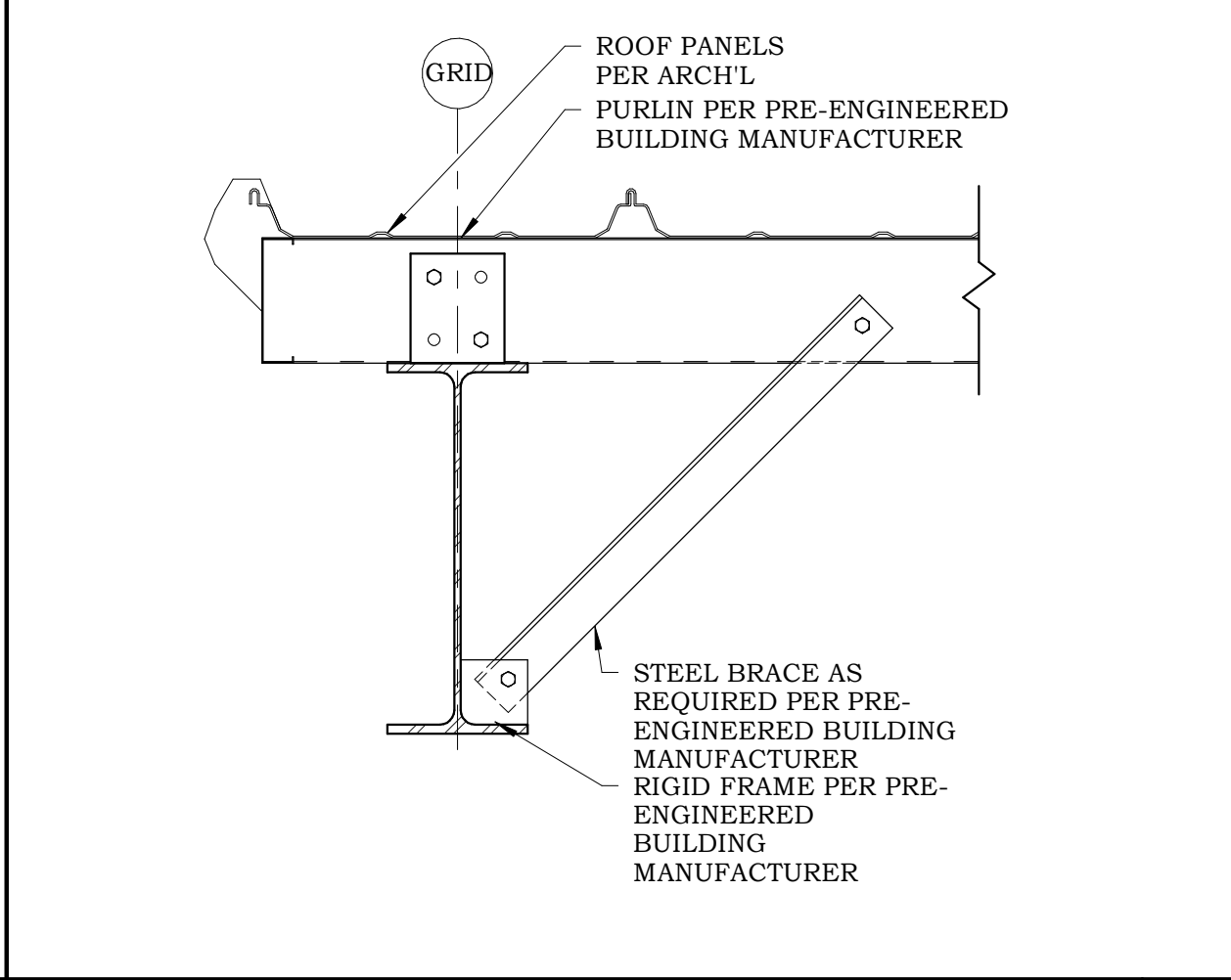
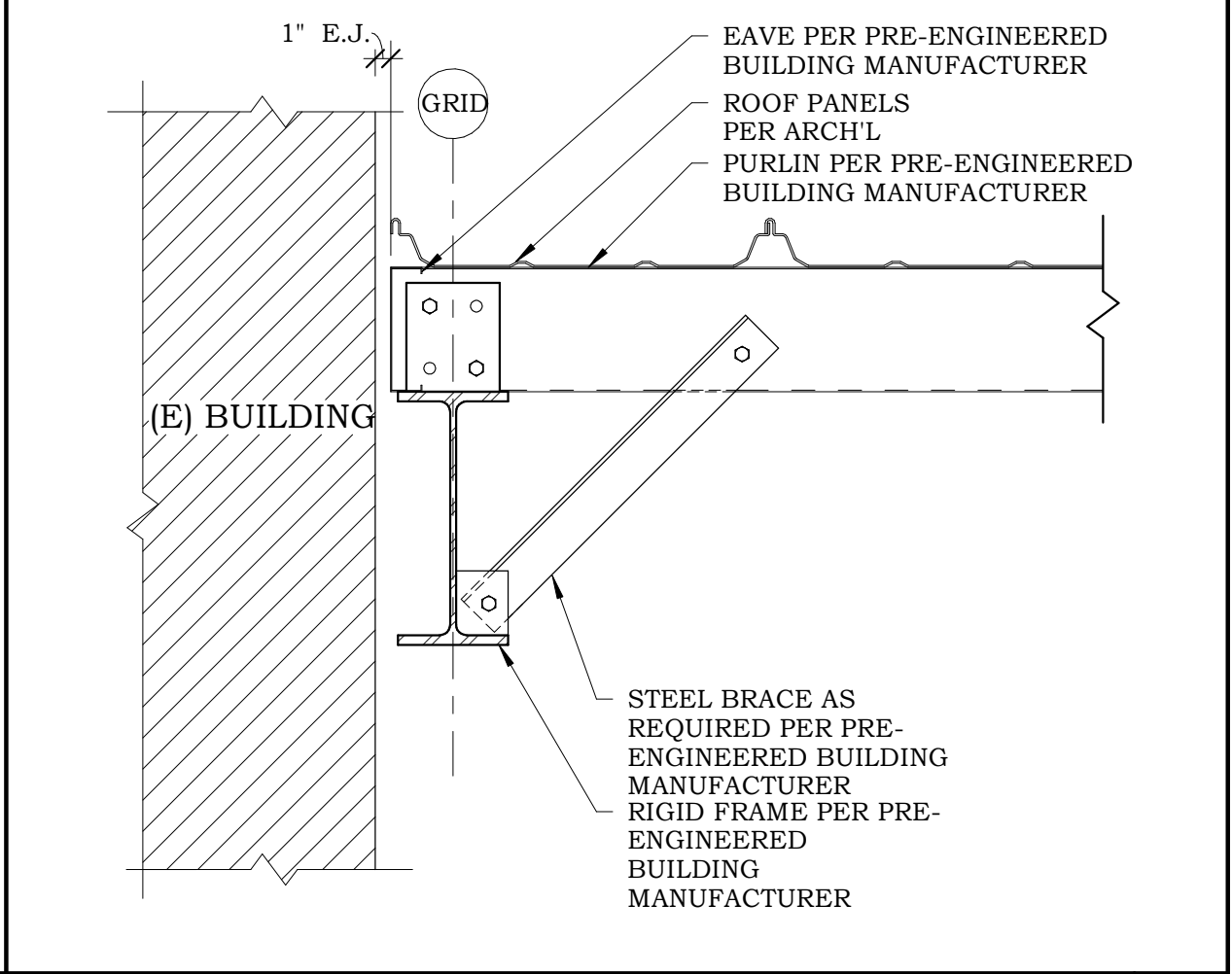
DATE:

REVISION / ADDENDA

NO. DATE DESCRIPTION

DETAILS

S.900

								<div> <div>CHANIN ENGINEERING, LLC</div> <div>400 Nolana, Suite H2 McAllen, Texas 78504</div> <div>PH: (956) 687-9421 FAX: (956) 687-3211</div> <div>www.chaninengineering.com</div> <div>TBPE FIRM REG. NUMBER F-9369</div> </div>	
WOOD MEMBER TO CMU WALL	17	WOOD JOIST TO CMU WALL	13	PURLIN TO RIGID FRAME	9	LEAN TO CONNECTION TO RIGID FRAME	6	NOT USED	1
									
(E) STEEL BEAM TO (E) STEEL RETROFIT COLUMN	18	WOOD MEMBER TO CMU WALL	14	CMU WALL TO LATERAL SUPPORT BEAM	11	PURLIN TO RIGID FRAME	7	PURLIN TO RIGID FRAME	2
									
CMU WALL TO (E) FOUNDATION	19	CUT FLOOR AT ELEVATOR	15	STEEL BEAM TO STEEL BEAM	12	PURLIN TO RIGID FRAME	8	PURLIN TO RIGID FRAME	3
									
NOT USED	20	NOT USED	16	STEEL BEAM TO STEEL BEAM	12	PURLIN TO RIGID FRAME	8	PURLIN TO RIGID FRAME	4

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DRAWN BY: E.F.S.

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DETAILS

S.901

GENERAL NOTES - MECHANICAL:

(1) THE MECHANICAL CONTRACTOR IS FULLY RESPONSIBLE FOR PERFORMING THE WORK IN FULL COMPLIANCE WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL CODES UNDER THIS SECTION OF THE CONTRACT. IF THE CONTRACTOR DETERMINES THAT THE CONTRACT DOCUMENTS AND PLANS ARE NOT IN COMPLIANCE WITH THE APPLICABLE LOCAL CODES, HE/SHE SHALL INFORM THE ARCHITECT PRIOR TO CONSTRUCTION START FOR DIRECTION. FAILURE TO DO SO SHALL NOT RELIEVE THE CONTRACTOR OF HIS RESPONSIBILITY TO MEET APPLICABLE LOCAL CODES, AND RE-WORK SHALL BE AT CONTRACTOR'S EXPENSE.

(2) CONTRACTOR SHALL HANG AND INSTALL ALL DUCTWORK FLUSH WITH THE BUILDING STRUCTURE TO ACCOMMODATE NEW CEILINGS. CONTRACTOR SHALL COORDINATE ALL INSTALLATION WORK WITH ARCHITECTURAL AND ELECTRICAL DESIGN. ALL DUCTWORK SHALL BE MODIFIED AS NECESSARY AND REQUIRED TO FIT AROUND BUILDING STRUCTURES, ARCHITECTURAL BUILD-OUT AND ELECTRICAL CABLE TRAY INSTALLATIONS. MECHANICAL CONTRACTOR SHALL FAMILIARIZE HIMSELF WITH THE WORK SCOPE OF OTHER TRADES AND PARTICIPATE IN COORDINATING ALL CONSTRUCTION EFFORTS.

(3) CONNECT EACH DIFFUSER TO THE MAIN DISTRIBUTION DUCTS WITH A FLEX-DUCT SECTION; CONNECTIONS SHALL BE COMPLETED IN ACCORDANCE WITH THE DETAIL. EACH FLEX-DUCT CONNECTION SHALL INCLUDE A BUTTERFLY DAMPER TO BE INSTALLED AT THE TRUNK DUCT.

(4) CONTRACTOR SHALL PROVIDE ALL DUCTWORK REQUIRED TO COMPLETE THE HVAC SYSTEM. TIE IN BRANCH DUCTS TO MAIN DUCTS WITH SHEET METAL FLANGES. FLANGE CONNECTION SHALL BE FASTENED WITH CRIMPED SHEET METAL STRIPS AND SEALED WITH SILICONE CAULK.

(5) CONTRACTOR SHALL SUPPLY AND INSTALL FIRE DAMPERS AND ACCESS DOORS IN THE HORIZONTAL DUCTS WHERE THEY PENETRATE FIRE WALLS & BARRIERS.

(6) ALL OPENINGS CUT IN MASONRY AND PLASTER WALLS OR CONCRETE FLOORS SHALL BE CORE DRILLED OR SAWED WHEN POSSIBLE. CONTRACTOR SHALL CHECK BUILDING CONSTRUCTION BEFORE MAKING PENETRATIONS TO AVOID CUTTING THROUGH STRUCTURAL BEAMS AND REINFORCING. CONTRACTOR SHALL INFORM THE ENGINEER IF REINFORCING IS CUT OR DAMAGED WHILE MAKING OPENINGS. CONTRACTOR SHALL REINFORCE ALL OPENINGS AS REQUIRED BY DRAWINGS AND SPECIFICATIONS. PATCH AND SEAL OPENINGS WITH 8000 PSI CEMENT GROUT. INSTALL DECORATIVE TRIM (EQUIPMENT FLANGES, FRAMING OR ESCUTCHEONS) AROUND OPENINGS IN FINISHED AREAS. COORDINATE ALL CUTTING AND PATCHING WITH THE OTHER TRADES

(7) ON ANY WORK SHOWN ON MECHANICAL DRAWINGS REQUIRING DEMOLITION OF EXISTING OR NEW BUILDING STRUCTURES AND FINISHES, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO COMPLETE THE NECESSARY DEMOLITION. CONTRACTOR SHALL PATCH AND REPAIR ALL DEMOLITION WORK. PATCHING SHALL BE COMPLETED WITH THE SAME MATERIALS AS THE SURROUNDING AREAS, OR WITH ARCHITECT-APPROVED PATCHING MATERIALS. REPAIRS SHALL BE COMPLETED ACCORDING TO ARCHITECTURAL SPECIFICATIONS. ALL REFINISHING SHALL BE APPROVED BY THE ARCHITECT.

(8) CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLETING THE INSTALLATION OF THE AIR DISTRIBUTION SYSTEM SHOWN. DUCTWORK, DUCT ACCESSORIES AND CONTROLS SHOWN AND REQUIRED SHALL BE SUPPLIED AND INSTALLED. ALL INSTALLATION WORK SHALL BE DONE IN ACCORDANCE WITH APPLICABLE CODES, INCLUDING NFPA 90A AND 90B, (NFPA 90A: STANDARD FOR THE INSTALLATION OF AIR-CONDITIONING AND VENTILATING SYSTEMS)(NFPA 90B: STANDARD FOR THE INSTALLATION OF WARM AIR HEATING AND AIR-CONDITIONING SYSTEMS)

(9) CONTRACTOR SHALL BALANCE ALL AIR DISTRIBUTION SYSTEMS TO ACHIEVE THE AIR VOLUME REQUIREMENTS INDICATED. BALANCING SHALL INCLUDE ADJUSTMENT OF ALL MANUAL VOLUME DAMPERS, SPLITTER DAMPERS, ZONE DAMPERS (IF REQUIRED), BUTTERFLY DAMPERS AND INDIVIDUAL DIFFUSER VOLUME DAMPERS (FINAL BALANCING ONLY). CONTRACTOR SHALL SUPPLY THE ENGINEER WITH A COMPLETE BALANCING REPORT WHICH INCLUDES: VOLUME, ROOM REFERENCE AND ZONE VOLUME TOTALS.

(10) MOUNT ALL THERMOSTATS (SENSORS) 48" ABOVE THE FINISHED FLOOR LEVEL. THERMOSTATS SHOWN SHALL BE IN CONTROL OF THE ZONE SYSTEM WHICH IS SUPPLYING AIR TO THE AREA WHERE THE THERMOSTAT IS LOCATED. CONTRACTOR SHALL SUPPLY AND INSTALL ALL CONTROL VOLTAGE WIRING AND CONDUIT FOR THERMOSTAT (DDC CONTROL) INSTALLATION.

(11) CONTRACTOR SHALL INSTALL NEW REFRIGERANT PIPING FLUSH WITH THE BUILDING STRUCTURE AND MECHANICAL ROOM BOUNDARIES AS SHOWN. CONTRACTOR SHALL COORDINATE ALL INSTALLATION WORK WITH DUCTS AND ELECTRICAL CONDUIT. MECHANICAL CONTRACTOR SHALL FAMILIARIZE HIMSELF WITH THE WORK SCOPE OF OTHER TRADES AND PARTICIPATE IN COORDINATING ALL CONSTRUCTION EFFORTS.

(12) ALL PIPING SHALL BE INSULATED AND JACKETED. REFER TO THE SPECIFICATIONS, THE CONDENSING AND ROOF TOP CONDENSER COILS ARE TO BE COATED IN ACCORDANCE WITH THE SPECIFICATIONS.

(13) PROVIDE SMOKE DETECTOR AND SHUTDOWN CONTROLS ON AIR HANDLERS AND SUPPLY FANS. SMOKE DETECTORS SHALL BE PROVIDED BY ELECTRICAL AND INSTALLED BY MECHANICAL. COORDINATE TO PROVIDE A COMPLETE SYSTEM. PROVIDE BOTH SUPPLY AND RETURN SIDE DEVICES.

(14) PROVIDE SEVEN DAY PROGRAMMABLE THERMOSTAT, 24 HOUR SINGLE/MULTI STAGE COMMERCIAL THERMOSTAT. DUAL SET POINTS, OCCUPIED AND UNOCCUPIED PERIODS, UNIT OPTIMIZATION, AUTO HEATING/COOLING AND AUTO CHANGE OVER. SUB-BASE BACK-UP BATTERY AND TEMPORARY OVER-RIDE. 24 VAC CONTROL VOLTAGE. PROVIDE PLASTIC SEE THRU PROTECTIVE COVER WITH KEY LOCK.

MECHANICAL SYMBOL LEGEND		MECHANICAL ABBREVIATIONS			
A/C	AIR CONDITIONED	MAX	MAXIMUM		
AD	ACCESS DOOR	MBD	MANUAL BALANCING DAMPER		
AFF	ABOVE FINISHED FLOOR	MD	MOTORIZED DAMPER		
AHU	AIR HANDLING UNIT	MECH	MECHANICAL		
APPROX	APPROXIMATE	MIN	MINIMUM		
ARCH	ARCHITECTURAL	MS	MOTOR STARTER		
BDD	BACK DRAFT DAMPER	NA	NOT APPLICABLE		
BHP	BRAKE HORSEPOWER	NC	NORMALLY CLOSED		
BTU	BRITISH THERMAL UNIT	NIC	NOT IN CONTRACT		
CFM	CUBIC FEET PER MINUTE	NO	NORMALLY OPEN		
CH	CHILLER	NTS	NOT TO SCALE		
CHP	CHILLED WATER PUMP				
CLG	CEILING	OA	OUTSIDE AIR		
CWP	CONDENSER WATER PUMP	OAH	OUTSIDE AIR INTAKE HOOD		
CO	CLEANOUT	OBD	OPPOSED BLADE DAMPER		
CT	COOLING TOWER	OC	ON CENTER		
CU	CONDENSING UNIT	P	PUMP		
CW	COLD WATER	PBD	PARALLEL BLADE DAMPER		
CL	CENTER LINE	PP	PRIMARY CHILLED WATER PUMP		
DB	DRY BULB	PRESS	PRESSURE		
DIA	DIAMETER	PRV	PRESSURE REDUCING VALVE		
DN	DOWN	PSIG	POUNDS PER SQUARE INCH (GAUGE)		
DWG	DRAWING				
DX	DIRECT EXPANSION	R	RETURN (AIR DEVICE)		
EAT	ENTERING AIR TEMPERATURE	RA	RETURN AIR		
EDH	ELECTRIC DUCT HEATER	RE: 4M7.01	REFER TO DETAIL 4, SHEET M7.01		
EF	EXHAUST FAN	RET	RETURN		
ELEC	ELECTRICAL	RH	RELATIVE HUMIDITY		
ELEV	ELEVATION	RHD	RELIEF HOOD		
F	DEGREES FAHRENHEIT	RPM	REVOLUTIONS PER MINUTE		
FC	FAN COIL	RTU	ROOF TOP UNIT		
FD	FIRE DAMPER				
FLEX	FLEXIBLE	S	SUPPLY (AIR DEVICE)		
FLG	FLANGE	SA	SUPPLY AIR		
FLR	FLOOR	SCH	SCHEDULE		
PFM	FEET PER MINUTE	SCHP	SECONDARY CHILLED WATER PUMP		
FT	FEET, FOOT	SD	SMOKE DAMPER		
FS	FLOW SWITCH	SEC	SECOND		
		SF	SUPPLY FAN		
GAL	GALLON	SMACNA	SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION		
GALV	GALVANIZED	SP	STATIC PRESSURE		
GPM	GALLONS PER MINUTE	SPEC	SPECIFICATION		
HB	HOSE BIBB	SF	SQUARE FOOT		
HP	HORSEPOWER	STD	STANDARD		
HR	HEAT PUMP (WATER SOURCE)				
HR	HOUR	TEMP	TEMPERATURE		
HVAC	HEATING/VENTILATING/ AIR CONDITIONING	TSTAT	THERMOSTAT		
HWP	HOT WATER PUMP	TYP	TYPICAL		
HZ	HERTZ	UF	UNDER FLOOR		
ID	INSIDE DIAMETER	UH	UNIT HEATER		
IE	INVERT ELEVATION (FLOW LINE)	UL	UNDERWRITERS LABORATORIES		
IN	INCHES	VEL	VELOCITY		
INSUL	INSULATION	VENT	VENTILATE		
IN WG	INCHES OF WATER	VF	VENTILATION FAN		
KW	KILOWATT(S)	VOL	VOLUME		
		VOLT	VOLTAGE		
LAT	LEAVING AIR TEMPERATURE	W	WIDE, WIDTH		
LB	POUND	W/	WITH		
L	LOUVER	WB	WET BULB		
		W/O	WITHOUT		

H.V.A.C. SYSTEM

THE WORK INCLUDES PROVIDING THE HVAC SYSTEMS, INCLUDING DUCTWORK, DIFFUSERS AND GRILLES, INSULATION, CONTROLS, AND ALL OTHER EQUIPMENT NECESSARY FOR A COMPLETE FUNCTIONING SYSTEM. HVAC SYSTEM SHALL INCLUDE BUT IS NOT LIMITED TO THE FOLLOWING:

- HEATING, VENTILATION, AND AIR CONDITIONING (HVAC) UNITS.
- SUPPLY AND RETURN DUCTWORK SYSTEMS WITH GRILLES, DIFFUSERS, FILTERS, AND DAMPERS.
- TEMPERATURE CONTROL SYSTEM INCLUDING LOW VOLTAGE WIRING AND CONDUIT.
- DUCT, PIPING, AND EQUIPMENT INSULATION, WHERE INDICATED HEREIN.
- CONTROLS AND WIRING FOR CONNECTION TO LANDLORD'S FIRE-SMOKE ALARM SYSTEM (WHERE APPLICABLE).

THE CONTRACTOR SHALL COORDINATE ALL NEW DUCTWORK INCLUDING DUCTWORK INSULATION AND REINFORCING WITH EXISTING DUCTWORK AND DUCTWORK ANGLE BRACING SUCH THAT THE NEW DUCTWORK WILL FIT WITHIN THE SPACE LIMITATIONS OF THE PROJECT.

CONDENSATE PIPING: CONDENSATE PIPING SHALL BE A MINIMUM OF 3/4" COPPER TYPE "L" PIPE. ALL CONDENSATE DRAINS SHALL BE INSULATED WITH 1/2" THICK CLOSED CELL INSULATION SIMILAR TO ARMAFLEX 2000.

THE DESIGN, SELECTION, SPACING AND APPLICATION OF HORIZONTAL PIPE HANGERS, SUPPORTS, RESTRAINTS, ANCHORS AND GUIDES SHALL BE IN ACCORDANCE WITH THE STANDARD CODE FOR PRESSURE PIPING AND B31.1 AND THE LATEST EDITION OF THE MANUFACTURERS STANDARDIZATION SOCIETY STANDARDS MSS SP-69 "PIPE HANGERS AND SUPPORTS-SELECTION AND APPLICATION"

PROVIDE PIPE COVERING PROTECTION SHIELDS AND SADDLES FOR ALL INSULATED PIPING AT THE LOCATIONS OF ALL SUPPORTS. THE PROTECTION SHIELD LENGTH AND GAUGE THICKNESS FOR USE AT EACH CLEVIS HANGER SHALL BE AS SPECIFIED FOR TYPE 40 PROTECTION SHIELDS IN THE CURRENT EDITION OF MSS SP-69. PROTECTION SHIELDS SHALL BE GALVANIZED AND SHALL BE ARRANGED TO COVER ONE-HALF OF THE CIRCUMFERENCE OF THE INSULATION AND SHALL BE MOUNTED ON THE OUTSIDE OF THE INSULATION WITH INSULATION BLOCKING BETWEEN THE PIPE AND SADDLE TO PREVENT CRUSHING OF THE INSULATION. INSULATION BLOCKING SHALL BE UPJOHN 2 POUND HIGH DENSITY MOLDED URETHANE OR SEGMENTED MACHINERY CORK DIPPED IN HOT ASPHALT VAPOR SEAL OF NOT LESS THAN THE SAME LENGTH AND CIRCUMFERENCE AS THE PIPE PROTECTION SHIELD.

ALL HANGERS, HARDWARE, RODS, CLAMPS, CHANNELS, BASE PLATES, ANGLES, BOLTS, NUTS AND OTHER FACTORY-BUILT OR SHOP FABRICATED PIPE SUPPORT DEVICES SHALL BE GALVANIZED OR CADMIUM PLATED UNLESS NOTED OTHERWISE ON THE DRAWINGS. ALL SHOP FABRICATED AND WELDED STEEL SUPPORTS SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION.

ALL CONCRETE INSERTS FOR HANGER RODS SHALL BE NATIONAL PIPE HANGERS CORPORATION FIGURE 406 WITH FIGURE 407, OR GRINNELL FIGURE 282, FIGURE 152, OR APPROVED EQUAL. METAL DECK CONCRETE INSERT SHALL BE F & S MANUFACTURING CORPORATION FIGURE 282, GALVANIZED FABRICATED STEEL METAL DECK CEILING BOLT, PHILLIPS RED HEAD, OR APPROVED EQUAL. HANGER RODS, INSERTS, ETC., SHALL BE SIZED AND INSTALLED AS RECOMMENDED BY THE HANGER MANUFACTURER FOR THE SERVICE INTENDED.

FIELD VERIFY THE EXACT SIZES AND LOCATIONS OF ALL EXISTING DUCTWORK AND PIPING PRIOR TO DEMOLITION OF ANY EXISTING WORK. THE DEMOLITION WORK SHALL BE COORDINATED WITH THE NEW WORK TO ASSURE PROPER LIMITS OF DEMOLITION.

WARRANTY: PROVIDE LABOR AND MATERIALS TO REPAIR OR REPLACE DEFECTIVE PARTS AND MATERIALS AS REQUIRED FOR ONE YEAR AFTER SUBSTANTIAL COMPLETION OR OWNER ACCEPTANCE OF THE COMPLETED PROJECT. PROVIDE A SEPARATE LINE ITEM DEDUCT AMOUNT ON THE PROPOSAL FORM TO DELETE WARRANTY SERVICE, AT THE OWNER'S OPTION.

DRAWINGS FOR HVAC WORK ARE DIAGRAMMATIC, SHOWING THE GENERAL LOCATION, TYPE, LAYOUT, AND EQUIPMENT REQUIRED. THE DRAWINGS SHALL NOT BE SCALED FOR EXACT MEASUREMENTS. REFER TO MANUFACTURER'S STANDARD INSTALLATION DRAWINGS FOR EQUIPMENT CONNECTIONS AND INSTALLATION REQUIREMENTS, AS REQUIRED. PROVIDE ALL DUCTWORK, CONNECTIONS, ACCESSORIES, OFFSETS, AND MATERIALS NECESSARY TO FACILITATE THE SYSTEM FUNCTIONING AS INDICATED BY THE DESIGN AND THE EQUIPMENT INDICATED. THE WORK SHALL BE IN ACCORDANCE WITH LOCAL CODES OR ORDINANCES AND SUBJECT TO INSPECTION.

COORDINATE WITH THE WORK OF OTHER SECTIONS, EQUIPMENT FURNISHED BY OTHERS, REQUIREMENTS OF THE LANDLORD, AND WITH THE CONSTRAINTS OF THE EXISTING CONDITIONS OF THE PROJECT SITE.

EXTRA STOCK: PROVIDE TWO SETS OF REPLACEMENT FILTERS PER EACH INSTALLED FOR ALL THE ROOFTOP UNITS, AND OTHER EQUIPMENT AND DEVICES, AND PROVIDE AN ITEMIZED LIST OF THE NUMBER, TYPE, REQUIRED, AND WHERE USED. OBTAIN RECEIPT FROM OWNER THAT THESE ITEMS HAVE BEEN DELIVERED AND ACCEPTED BY THE OWNER'S REPRESENTATIVE.

DUCT DIMENSIONS: UNLESS OTHERWISE NOTED, DUCT DIMENSIONS ON DRAWING ARE SHEET METAL DIMENSIONS ON UNLINED DUCTS (INTERIOR DIMENSIONS).

SHEET METAL DUCTWORK: SHEET METAL DUCTWORK SHALL BE FABRICATED AND INSTALLED TO MEET ASHRAE AND SMACNA STANDARDS, FOR 1" W.G. PRESSURE CLASS. SHEET METAL SHALL BE GALVANIZED SHEET STEEL OF LOCK FORMING QUALITY, ASTM A-525. ALL ANGLE IRON USED FOR SUPPORT SHALL BE GALVANIZED. CONNECTIONS TO WALLS OR FLOOR SHALL BE AIR TIGHT WITH ANGLE IRON AND CAULKING. SEAL ALL DUCT SEAMS, TRANSVERSE AND LONGITUDINAL, AIR TIGHT. PROVIDE TURNING VANES AT ALL ELBOWS OR OFFSETS EXCEEDING 30°.

DUCT SHALL BE EXTERNALLY WRAPPED W/ 2" FIBERGLASS BLANKET INSULATION.

RIGID ROUND GALVANIZED DUCT SHALL BE SPIRAL OR SNAP LOCK GALVANIZED SHEETMETAL COMPLYING WITH SMACNA.

FIBERGLASS DUCT BOARD IS AN ACCEPTABLE W/ PRIOR WRITTEN OWNER PERMISSION. MINIMUM R-VALUE OF 5 REQUIRED FOR CONDITIONED SPACES AND MINIMUM R-VALUE OF 8 FOR UNCONDITIONED SPACES.

FLEXIBLE DUCT CONNECTOR: WHERE INDICATED PROVIDE U.L. LABELED 30oz. NEOPRENE COATED FIBERGLASS FABRIC DUCT CONNECTORS.

GRILLES AND DIFFUSERS: PROVIDE GRILLES, DIFFUSERS, AND DAMPERS IN SIZES, CAPACITIES, MATERIALS, AND PATTERN INDICATED ON THE DRAWINGS.

ACCESS PANELS: PROVIDE HINGED ACCESS PANELS IN DUCTWORK WHERE REQUIRED FOR ACCESS TO EQUIPMENT. PROVIDE INSULATED ACCESS DOORS IN INSULATED DUCTWORK.

PROVIDE WHERE APPLICABLE, DUCT MOUNTED SUPPLY AND/OR RETURN AIR PHOTOELECTRIC TYPE UL LISTED SMOKE DETECTORS. DETECTORS SHALL BE LISTED FOR THE AIR VELOCITIES ENCOUNTERED. PROVIDE INTERLOCK WIRING AND RELAYS FOR UNIT SHUT DOWN. ON ACTIVATION OF ANY DETECTOR, ALL HVAC UNIT FANS SHALL STOP.

TEST AND ADJUST EACH PIECE OF EQUIPMENT AND EACH SYSTEM AS REQUIRED TO ASSURE PROPER BALANCE AND OPERATION. TEST AND BALANCE SHALL BE PERFORMED BY AN INDEPENDENT NEBB OR AABC REGISTERED CONTRACTOR. ELIMINATE NOISE AND VIBRATION, AND ASSURE PROPER FUNCTION OF ALL CONTROLS. MAINTENANCE OF TEMPERATURE, AND OPERATION, BALANCE MECHANICAL SYSTEM, AND SUBMIT COMPLETED TEST

EXPOSED ROUND (SPIRAL) DUCT TO BE INTERNALLY LINED. SUPPLY DUCTWORK SHALL BE LINED W/1" INSULATION. RETURN/EXHAUST/VENTILATION DUCT TO BE LINED W/1/2" INSULATION. CONCEALED ROUND DUCT TO BE EXTERNALLY INSULATED. USING R-5 INSULATION MIN FOR CONDITIONED SPACES (WHERE PLENUM RETURN IS USED) OR R-6 INSULATION MIN FOR UNCONDITIONED SPACES.

11700 NORTH IH35
AUSTIN, TEXAS 78753
PH: 512.474.6526
FAX: 512.474.6761
204 E. STUBBS
STREET
EDINBURG, TX
PH: 281.956.3864
FAX: 956.386.0613

NEGRETE & KOLAR
ARCHITECTS, LLP
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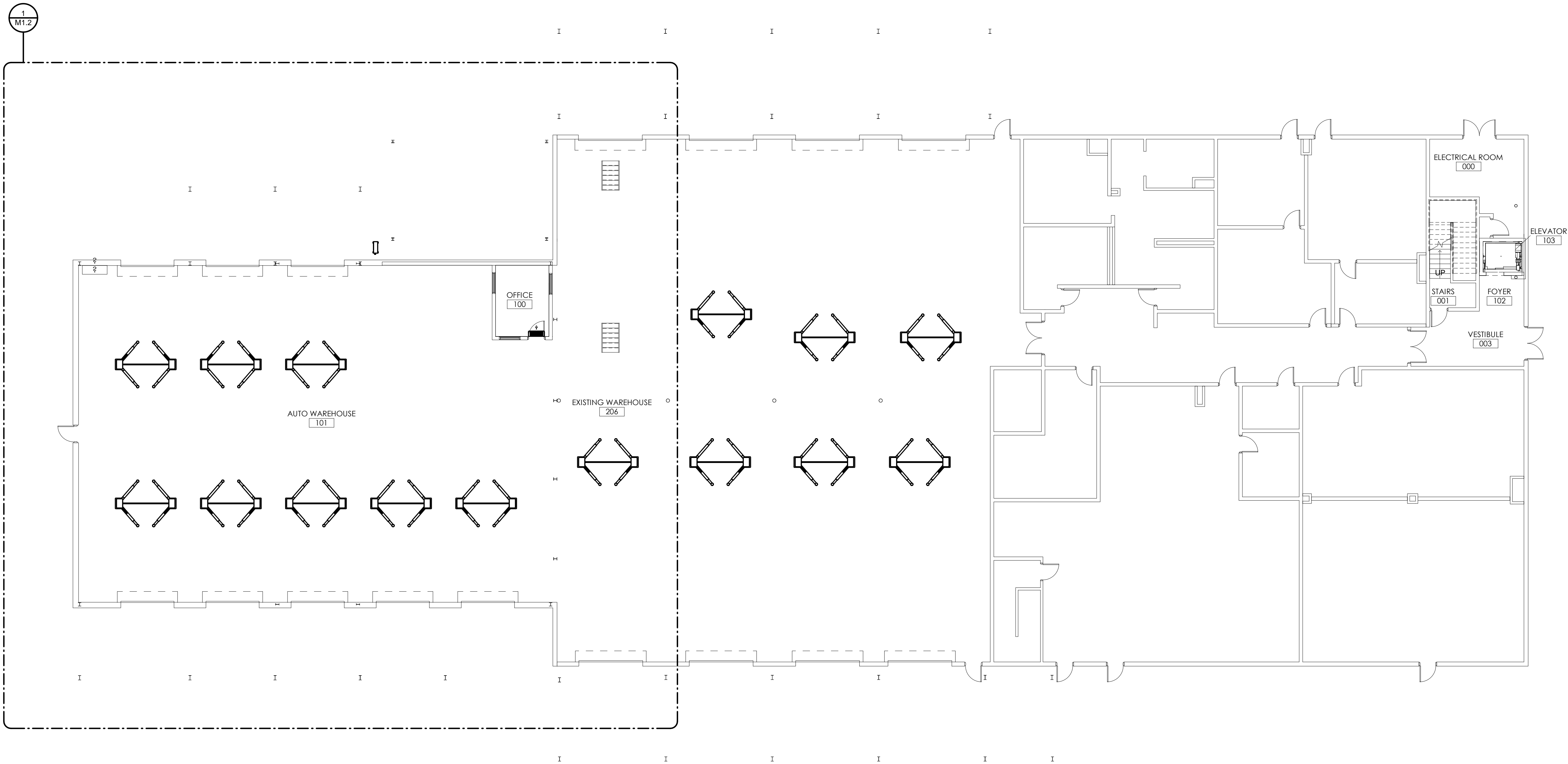
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MECHANICAL
NOTES AND
LEGEND

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78596 p:956.973.0500 f: 956-351-5750
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1 MECHANICAL FLOOR PLAN - OVERALL FIRST FLOOR
M1.1 SCALE: 3/32" = 1'-0" REF:

11700 NORTH IH35
AUSTIN, TEXAS 78753
PH: 512.474.6526
FAX: 512.474.6761

204 E. STUBBS
STREET
EDINBURG, TX
PH: 956.386.0611
FAX: 956.386.0613

NEGRETE & KOLAR
ARCHITECTS^{LLP}
WWW.NEKOARCH.COM

STATE OF TEXAS
Wilford L. McGee III
121939
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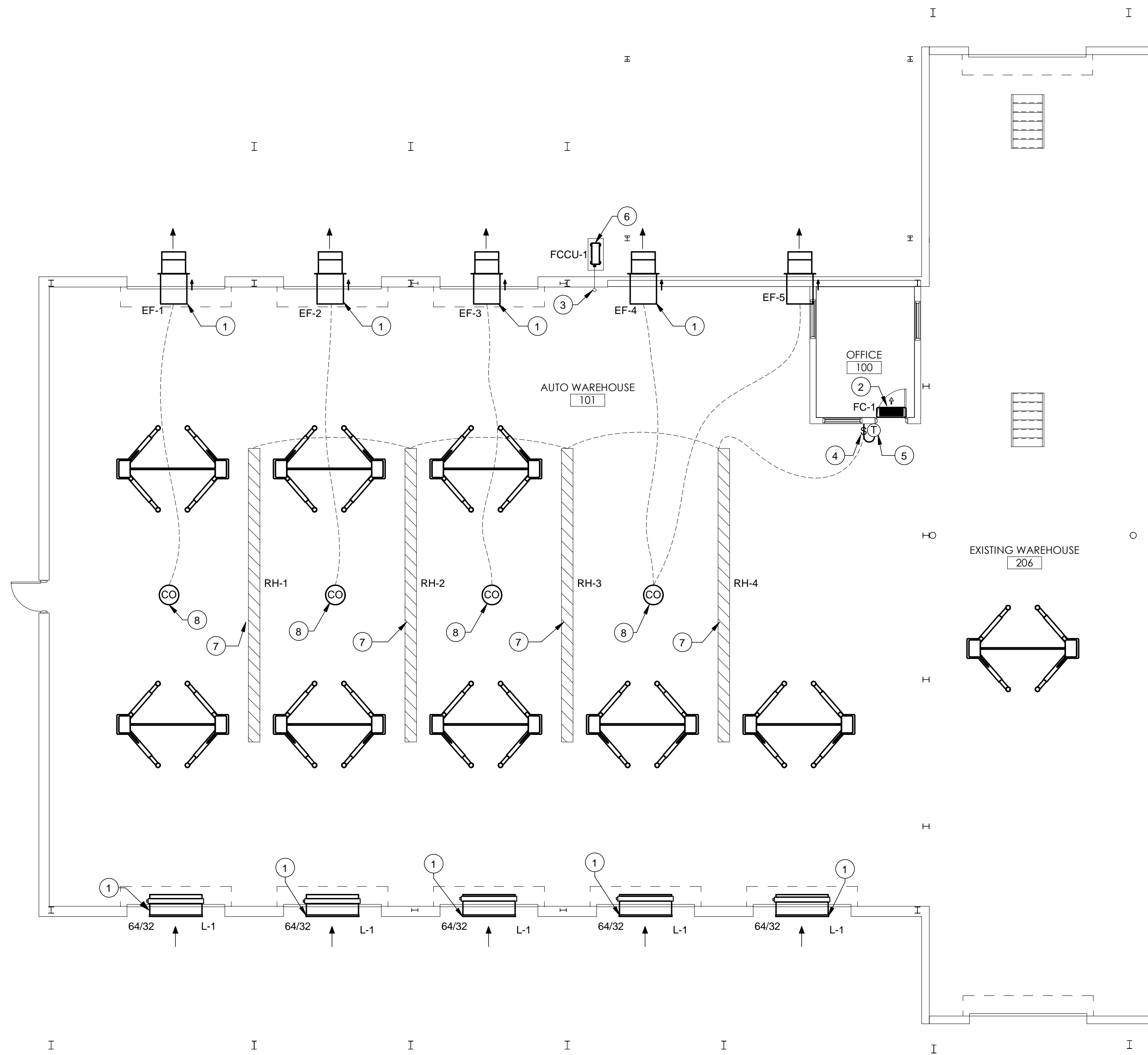
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MECHANICAL
FLOOR PLAN

M1.1



MECHANICAL KEYED NOTES	
1	COORDINATE LOCATION OF LOUVERS/HVAC EQUIPMENT. TO NOT CONFLICT WITH CONTROL JOINTS AND DOWNSPOUTS, COORDINATE W/ARCH FOR MOUNTING HEIGHT.
2	MOUNT AIR CONDITIONING UNIT CENTERED ABOVE DOOR. REFER TO PLUMBING PAGES FOR CONDENSATE ROUTING.
3	PROVIDE W/ REFRIGERANT LINE WALL PENETRATION HOUSING/PANEL EQUAL TO "WALL VAULT" MADE BY "ROOF PENETRAITION HOUSINGS, LLC". WALL PANEL TO BE SIZED TO ACCOMMODATE REFRIGERANT LINES & CONDUIT. COORDINATE W/ ELECTRICAL. REFRIGERANT CIRCUIT ACCESS PORTS LOCATED OUTDOORS SHALL BE SECURED WITH LOCK-TYPE TAMPER-RESISTANT CAPS OR SHALL BE OTHERWISE SCORED TO PREVENT UNAUTHORIZED ACCESS. PROVIDE ALUMINUM JACKETING ON ALL LINES EXTERIOR TO THE BUILDING.
4	WALL MOUNTED SWITCH FOR ENABLING OF RADIANT HEATERS, REFER TO MANUFACTURERS INSTALLATION WIRING DIAGRAM.
5	PROVIDE WITH THERMOSTAT AT 48" A.F.F. EQUAL TO MANUFACTURERS ACCESSORIES.
6	PLACE CONDENSING UNIT ON 4" CONCRETE PAD.
7	SUSPEND RADIANT HEATER FROM STRUCTURE. REFER TO INSTALLATION DOCUMENTS FOR HANGING HEIGHTS. COORDINATE HANGING HEIGHT WITH ARCHITECTURE AND LIGHTING PRIOR TO SUSPENDING.
8	PROVIDE WITH "ACME MULTI-GAS DETECTION AND CONTROL SYSTEM" EQUAL TO MODEL "CEL4" CAPABLE OF UTILIZING UP TO 4 REMOTE SENSORS. REMOTE SENSORS TO MONITOR CARBON MONOXIDE (CO). INTERLOCK SENSOR(S) WITH INDICATED EXHAUST FAN(S) TO CONTROL VENTILATION IN SPACE AND PROVIDE WITH MANUAL OVERRIDE SWITCH. FAN(S) TO RUN ON ALARM. INSTALL AS PER MANUFACTURERS INSTRUCTIONS. CONTROL WIRING, RELAYS, AND STARTERS BY ELECTRICAL CONTRACTOR. CARBON MONOXIDE (CO) CONCENTRATION NO TO EXCEED 50 PPM.

1 MECHANICAL FIRST FLOOR PLAN - ENLARGEMENT
M1.2 SCALE: 1/8" = 1'-0" REF: M1.1

11720 NORTH IH35
AUSTIN, TEXAS 78753
PH: 512.474.6526
FAX: 512.474.6761

204 E. STUBBS
STREET
EDINBURG, TX
PH: 281.384.0611
FAX: 956.386.0613

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ARCHITECTS^{LLP}
WWW.NEKOARCH.COM

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Wilford L. McGee III
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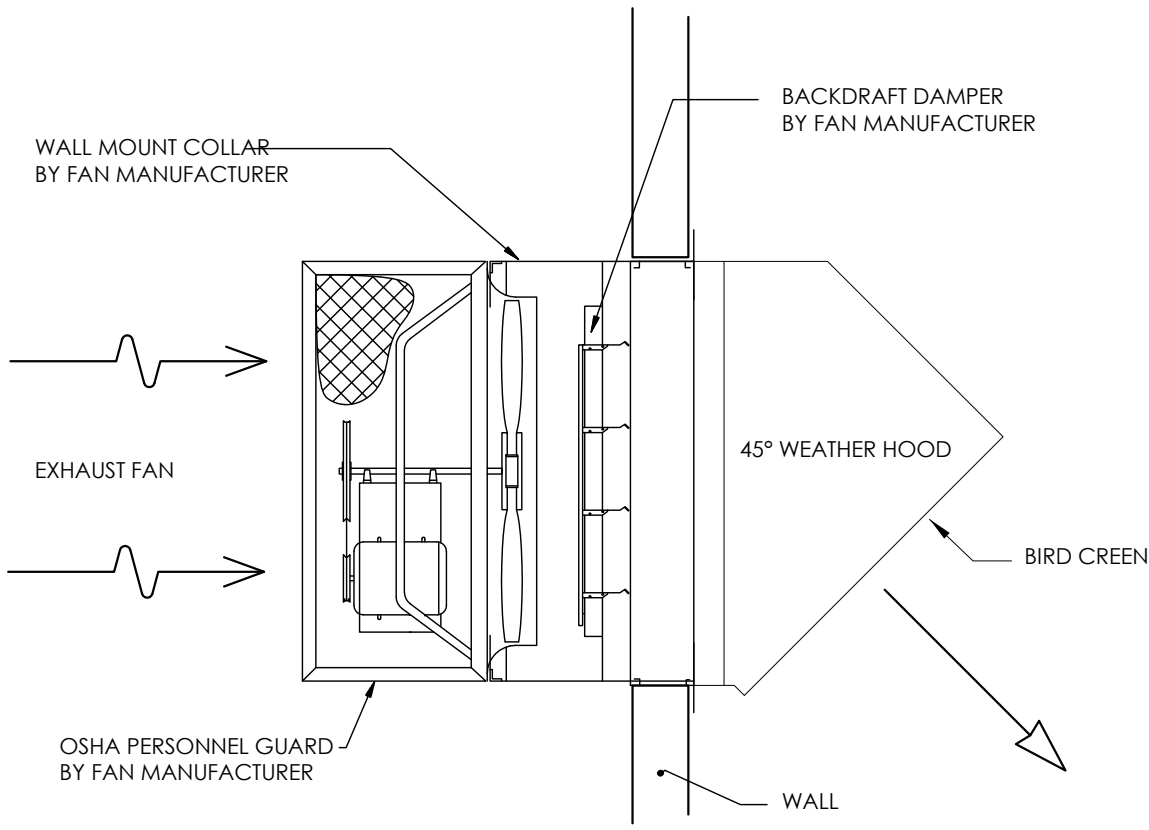
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MECHANICAL
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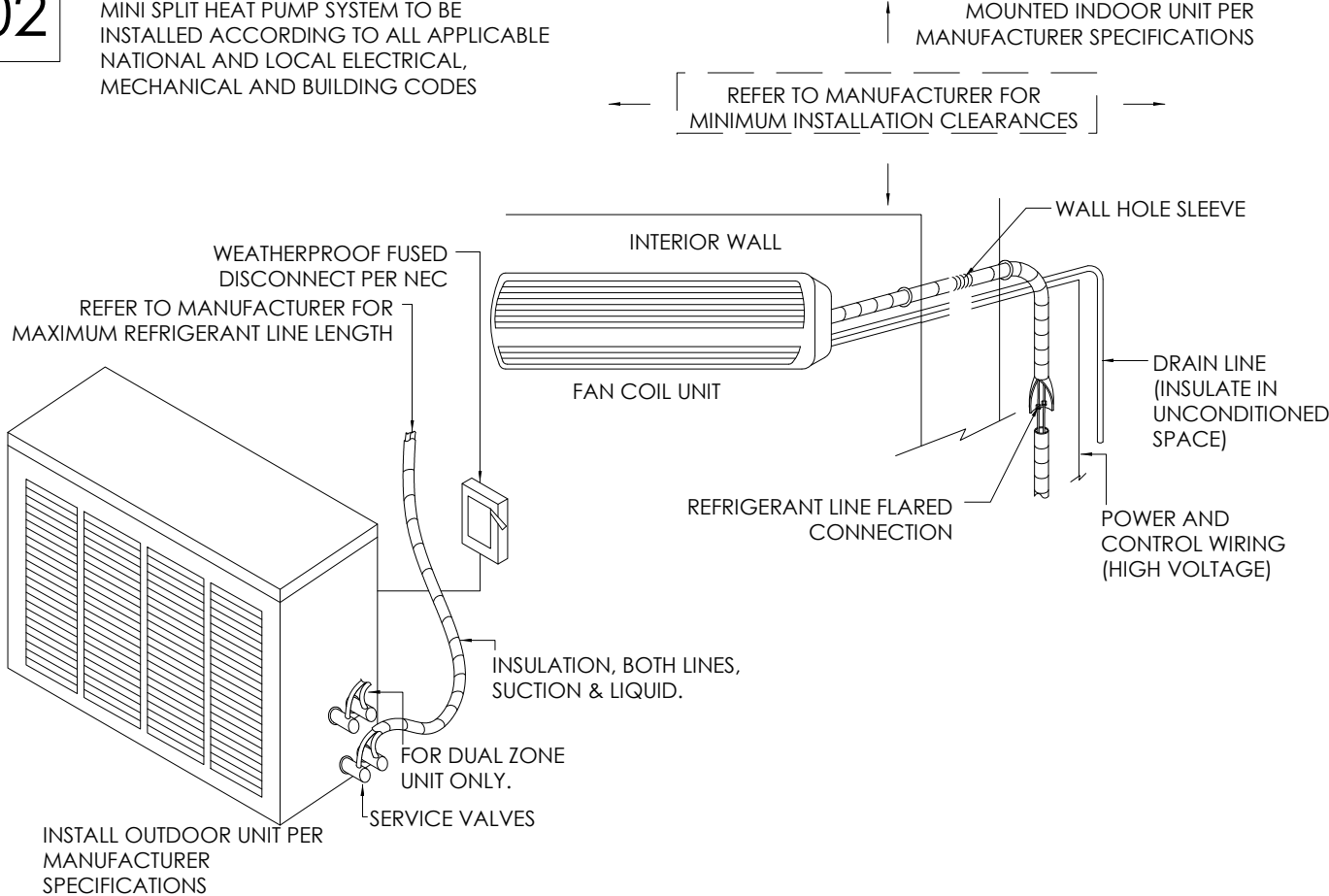
M1.2

01



WALL PROPELLER FAN DETAIL
NO SCALE

02



MINI SPLIT UNIT - CONDENSER AND EVAPORATOR
NO SCALE

03

04

DX MINI-SPLIT SCHEDULE

INDOOR UNIT TAG	FC-1
SERVES	OFFICE
LOCATION	WALL
UNIT TYPE	HEAT PUMP
FAN PROPERTIES	
MIN SUPPLY (CFM)	400
MINIMUM O/A (CFM)	0
UNIT CAPACITIES	
ENTERING AIR (DB/WB)	74/62
TOTAL CAPACITY (BTUH)	9,000
HEATING CAPACITY (BTUH)	9,000
UNIT DETAILS	
VOLTAGE/PHASE	208/1
MANUFACTURER	DAIKIN
MODEL NO.	FTX09
MAX WEIGHT (LBS)	25
CONDENSING UNIT TAG	
FCCU-1	
DETAILS	
VOLTAGE/PHASE	208/1
MCA/MOCP	13/15
AMB. AIR TEMP. (CLG°F/HTG°F)	104/33
REFRIGERANT	R-410A
COOLING MODE OPER. RANGE	50°F - 110°F
HEATING MODE OPER. RANGE	5°F -065°F
MANUFACTURER	DAIKIN
MODEL NO.	RX09
MAX WEIGHT (LBS)	50
MIN COOL/HEAT EFFICIENCY	19 SEER/9 HSPF
MIN EQUIV. LINE LENGTH (FT)	65
MIN VERTICAL RISE (FT)	45
CONTROL TYPE	
WL-RC	
NOTES	
ALL	

- NOTES:
01. ELECTRICAL CONTRACTOR TO PROVIDE SINGLE CIRCUIT POWER FROM SERVICE TO OUTDOOR UNIT & WIRE TO INDOOR UNIT.
 02. WIRELESS REMOTE CONTROLLER.
 03. PROVIDE INDOOR UNITS WITH MOUNTING BRACKETS IF REQUIRED.
 04. SEE PLUMBING FOR CONDENSATE ROUTING.
 05. CONTRACTOR TO PROVIDE CONCRETE PAD TO ANCHOR CONDENSER TO.
 06. CONTRACTOR TO PROVIDE LINE SETS.
 07. SIGHT GLASSES, FILTER DRYERS, & FIELD SUPPLIED EXPANSION VALVES ARE NOT TO BE USED ON THIS EQUIPMENT.
 08. INSTALL PER MANUFACTURERS INSTRUCTIONS & PIPING RECOMMENDATIONS.

RADIANT HEATER SCHEDULE

TAG	RH-1,2,3,4
SERVICE	NEW SHOP
LOCATION	STRUCTURE
HEATING DATA	
NOMINAL HEAT INPUT	40,000 BTU/Hr
HEATER LENGTH	30 FT
CONFIGURATION	SINGLE TUBE
FUEL TYPE	LIQUID PROPANE
ELECTRICAL DATA	
ELECTRICAL SUPPLY	120/1
UNITARY FAN MOTOR DETAILS	120/1
CURRENT RATING	1.2 A
DETAILS AND ACCESSORIES	
GAS CONNECTION	1/2" N.P.T. NIPPLE
NUMBER OF INJECTORS	1
VENT SIZE	6"
MANUFACTURER	
AMBRAD	
MODEL	
VPLUS40	
NOTES	
ALL	

NOTES:

01. PROVIDE ALL REQUIRED SPARE PARTS AS RECOMMENDED BY MANUF.
02. FOLLOW ALL MANUFACTURER SUGGESTED INSTALLATION GUIDELINES.
03. PROVIDE ALL HARDWARE NEEDED FOR FULLY OPERATIONAL INSTALLATION.
04. PROVIDE ALL ACCESSORIES& LABOR FOR VERTICAL VENTING THROUGH ROOF.
05. MECHANICAL CONTRACTOR TO PROVIDE W/ WALL MOUNTED SWITCH & T-STAT AS PER MANUFACTURER'S ACCESSORIES & INSTALLATION REQUIREMENTS. REFER TO ELEC FOR OPERATION, TO BE WIRED BY ELECTRICAL CONTRACTOR.

LOUVER SCHEDULE

TAG	L-1
TYPE	VENTILATION
SERVICE	SHOP
DETAILS AND ACCESSORIES	
MAX CFM	5000
LENGTH/HEIGHT (IN)	64/32
FREE AREA (SQ FT)	6.86
MAX VELOCITY (FPM)	730
MAX PRESSURE DROP (IN. H2O)	0.1
FINISH	1.2 mils 70% PVDF
INCLUDED SCREENS	BIRD
ACTUATION TYPE	NONE
BORDER STYLE	2" FLANGE
MANUFACTURER	GREENHECK
MODEL	EDJ-401
NOTES	1

NOTES:

01. LOUVER OPENING TO BE STRUCTURALLY BRACED.
02. SEAL OPENING WEATHER TIGHT WITH APPROVED SEALS/GASKETS.
03. PROVIDE WITH 120V MOTORIZED ACTUATOR AND ALL LINKAGE NECESSARY.
04. MECHANICAL CONTRACTOR TO PROVIDE WITH WALL MOUNTED SWITCH. REFER TO ELEC FOR OPERATION, TO BE WIRED BY ELECTRICAL CONTRACTOR.

FAN SCHEDULE

TAG	EF-1-5
SERVICE	AUTO WRHS
LOCATION	WALL
FAN PROPERTIES	
CFM	5000
FAN RPM	1251
EXT SP (IN WG)	0.2
FAN POWER	3/4 HP - ECM
VOLTS/PHASE	208/1
SOUND LEVEL	18.7 SONES
MOUNTING	WALL MOUNT
MANUFACTURER	GREENHECK
MODEL	AER-E24C-320-VG
MAX WEIGHT	100 lbs
NOTES	1-8

NOTES:

01. PROVIDE WITH FACTORY INSTALLED DISCONNECT.
02. PROVIDE W/ WALL MOUNTED SWITCH.
03. PROVIDE W/ BACKDRAFT DAMPER.
04. PROVIDE W/ EC MOTOR & FAN MOUNTED SPEED CONTROLLER.
05. PROVIDE W/ LIFTING LUGS.
06. PROVIDE W/ ALL HARDWARE/ACCESSORIES FOR SIDEWALL MOUNTING.
07. PROVIDE W/ FAN HOUSING, FLUSH W/ EXTERIOR.
08. PROVIDE W/ FAN DISCHARGE 45° WEATHERHOOD.
09. PROVIDE WITH BIRD SCREEN.

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AUSTIN, TEXAS 78753
PH: 512.474.6526
FAX: 512.474.6761
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STREET
EDINBURG, TX
77541
PH: 956.386.0611
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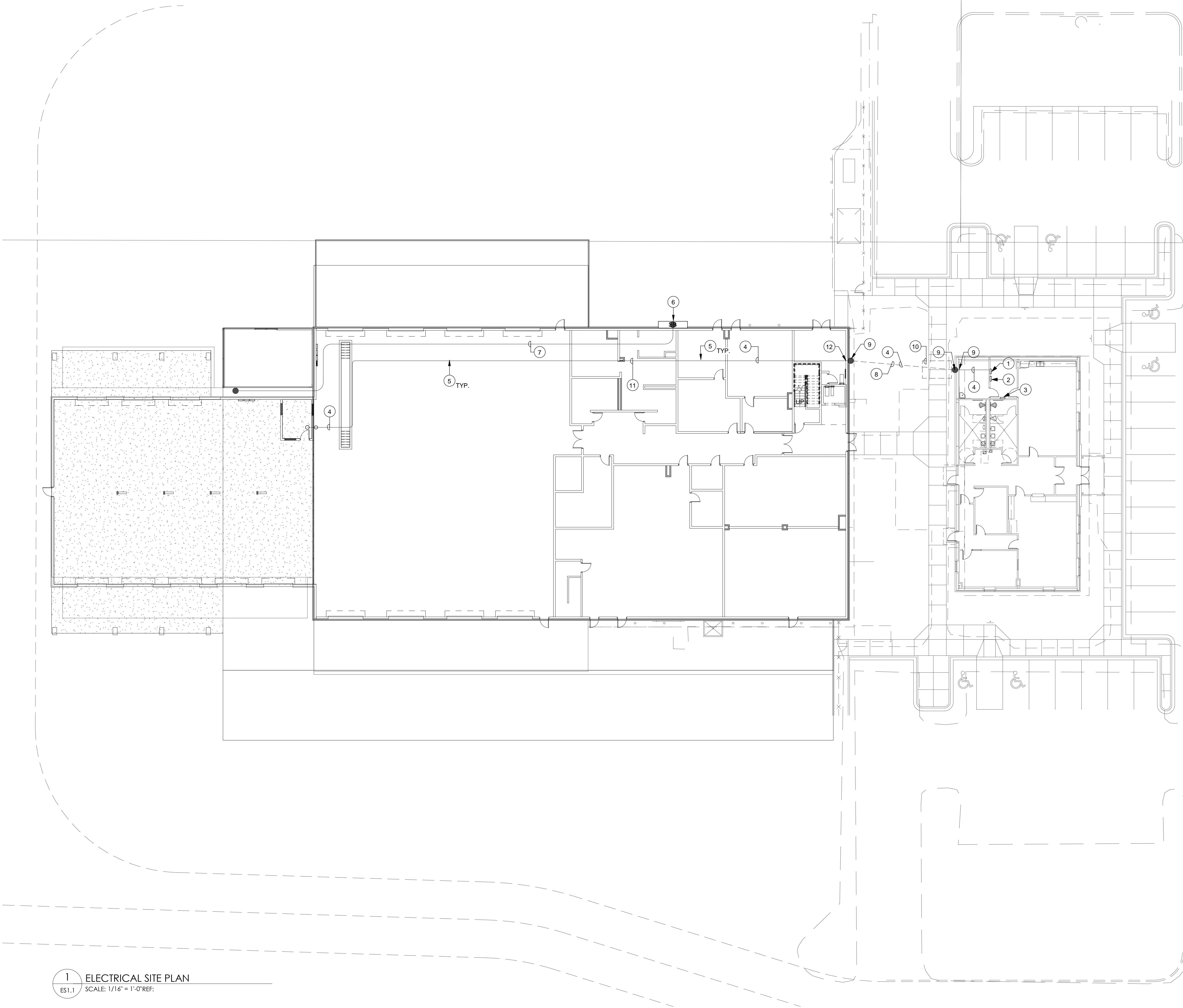
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MECHANICAL
DETAILS &
SCHEDULES

M2.0



GENERAL NOTES - ELECTRICAL SITE

- A. CONTRACTOR TO VERIFY ALL EXISTING MAIN POWER SERVICES AND COORDINATE WITH POWER COMPANY FOR ALL NEW REQUIREMENTS AND ALL COST ASSOCIATED. CONTRACTOR SHALL INCLUDE ANY COST FOR THE NEW TRANSFORMER AND OTHER ASSOCIATED FEES IN BID. CONTRACTOR IS RESPONSIBLE TO VERIFY ALL FEES WITH POWER COMPANY AND TO INCLUDE IN BID. CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH POWER COMPANY AS SOON THE CONTRACT IS AWARDED TO ORDER TRANSFORMER AND THE RELATED ELECTRICAL SERVICE EQUIPMENT AS SOON AS POSSIBLE.
- B. CONTRACTOR IS RESPONSIBLE FOR ALL EXCAVATION, TRENCHING AND BACKFILLING. COORDINATE WITH ALL UTILITIES PRIOR TO EXCAVATION.
- C. CONTRACTOR TO VERIFY ALL EXISTING MAIN TELEPHONE SERVICES AND COORDINATE WITH TELEPHONE COMPANY FOR ALL REQUIREMENTS AND ALL COST ASSOCIATED. INCLUDE ALL COST IN BID. CONDUIT FROM MAIN TELEPHONE RISER SHALL BE FURNISHED AND INSTALLED BY ELECTRICAL CONTRACTOR.
- D. ALL ELECTRICAL EQUIPMENT OUTDOORS SHALL BE RATED TYPE NEMA 3R UNLESS OTHERWISE NOTED.
- E. CONTRACTOR SHALL HAVE A WORKING KNOWLEDGE OF LOCAL CODES AND ORDINANCES. ALL WORK SHALL CONFORM TO NATIONAL ELECTRICAL CODES AND ALL OTHER AUTHORITY HAVING JURISDICTION. OBTAIN PERMITS AND PAY ALL FEES. PERFORM MODIFICATIONS TO MEET CODE AND ORDINANCE REQUIREMENTS AT NO ADDITIONAL COST TO OWNER, ARCHITECT OR ENGINEER. VERIFY PRIOR TO BID DATE.
- F. VERIFY AT JOB SITE THE EXACT LOCATIONS OF STRUCTURAL MEMBERS SUCH AS BEAMS, COLUMNS, ETC. TO LOCATE EQUIPMENT CONDUIT, PANELS AND DEVICES. IF DEVIATIONS FROM THE DRAWING ARE NECESSARY TO MEET STRUCTURAL CONDITIONS MAKE DEVIATIONS WITHOUT ADDITIONAL COST, TO OWNER, ARCHITECT, OR ENGINEER.
- G. IN COOPERATION WITH OTHER CONTRACTORS, DETERMINE THE EXACT LOCATION OF EQUIPMENT AND DEVICES AND CONNECTIONS THERETO BY REFERENCE TO THE SUBMITTALS AND ROUGH-IN DRAWINGS, AND BY MEASUREMENTS AT THE SITE. REFER TO ALL OTHER TRADES SUBMITTAL FOR ELECTRICAL INFORMATION.
- H. GROUND ENTIRE ELECTRICAL SYSTEM IN STRICT ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE.
- I. VERIFY AT JOB SITE GENERAL WORK TO BE DONE AS SPECIFIED, AS NOTED, OR AS REQUIRED FOR INSTALLATION ELECTRICAL SYSTEMS PRIOR TO SUBMISSION OF BIDS.
- J. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS AND EQUIPMENT TO BE REMOVED AND REPLACED BEFORE SUBMITTING HIS BID.
- K. ELECTRICAL DRAWINGS ARE DIAGRAMMATIC AND SMALL SCALE ONLY. THEY CONVEY THE INTENT OF THE WORK BUT DO NOT SHOW DETAIL SUCH AS JUNCTION AND PULL BOXES REQUIRED BY THE SPECIFICATIONS AND THE NATIONAL ELECTRICAL CODE(NEC). PROVIDE ALL MATERIALS AND METHODS CALLED FOR IN THE SPECIFICATIONS AND AS REQUIRED IN THE NEC TO PROVIDE A COMPLETE INSTALLATION OF ALL WORK.
- L. ALL WIRING SHALL BE COPPER.
- M. ALL SLEEVES, PENETRATIONS, ETC. SHALL BE SEALED SOLID NON-SHRINKING MATERIAL IMMEDIATELY UPON FILLING OF THE OPENING WITH PIPE OR CONDUIT.
- N. ARRANGE FOR SOURCES OF TEMPORARY CONSTRUCTION SERVICES. SUCH SERVICES SHALL BE NOMINALLY 120/240V, 1-PHASE, 3-WIRE FROM WHICH A COMPLETE SYSTEM OF TEMPORARY POWER AND LIGHTING SHALL BE PROVIDED FOR ALL CONSTRUCTION NEEDS.

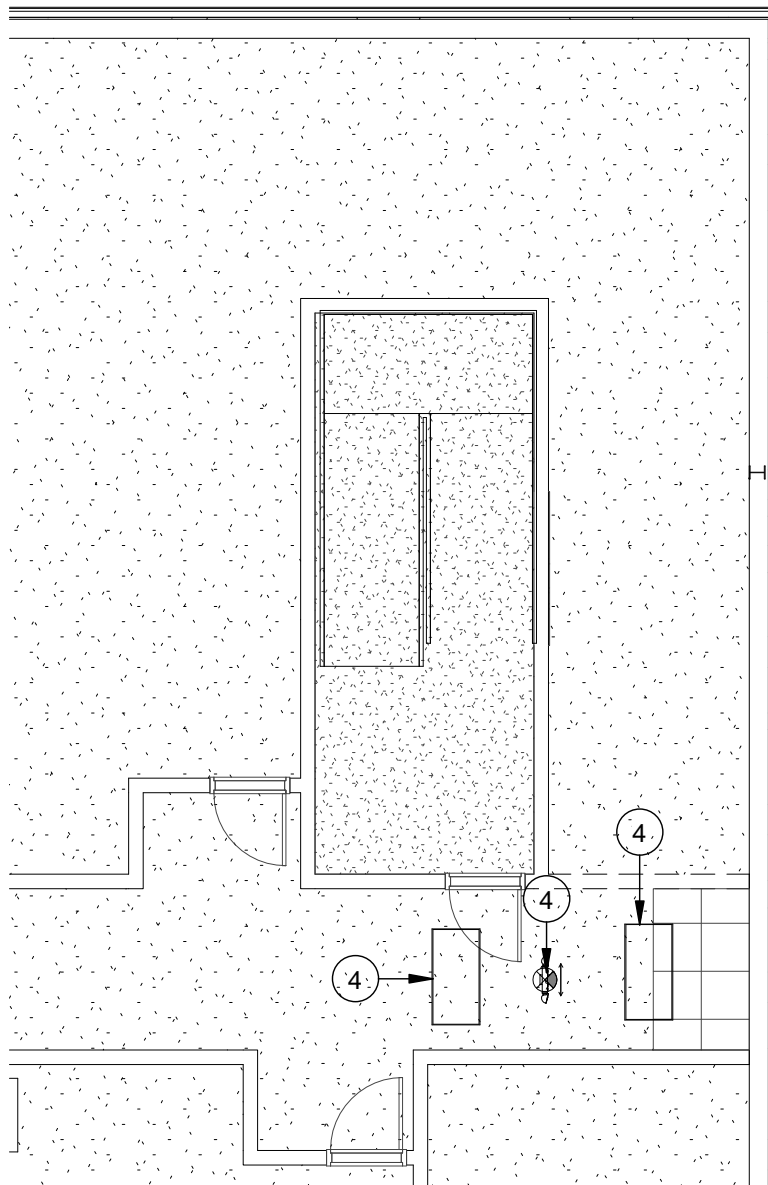
ELECTRICAL KEYNOTES	
1	APPROXIMATE LOCATION OF EXISTING INTERCOM SYSTEM PANEL. FIELD VERIFY EXISTING CONDITIONS PRIOR TO COMMENCING ANY WORK.
2	APPROXIMATE LOCATION OF EXISTING SECURITY PANEL. FIELD VERIFY EXISTING CONDITIONS PRIOR TO COMMENCING ANY WORK.
3	APPROXIMATE LOCATION OF EXISTING FIRE ALARM CONTROL PANEL MFR CERBERUS PYROTRONICS PXL SHALL BE REPLACED WITH NEW SIEMENS ADDRESSABLE FIRE ALARM CONTROL PANEL. ALL EXISTING FIRE ALARM CIRCUITS TO BE MONITORED BY NEW FIRE ALARM CONTROL PANEL. CONTRACTOR TO INCLUDE COST IN BID FOR A COMPLETE CODE COMPLIANT OPERABLE FIRE ALARM SYSTEM. FIELD VERIFY EXISTING CONDITIONS PRIOR TO COMMENCING ANY WORK.
4	PROVIDE 1-2" CONDUIT FOR FIRE, 1-2" CONDUIT FOR INTERCOM, 1-2" FOR SECURITY. COORDINATE ALL ROUTING IN THE FIELD. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING A FUNCTIONAL AND COMPLETE SYSTEM THAT IS CODE COMPLIANT.
5	COORDINATE EXACT CONDUIT ROUTING IN THE FIELD. FIELD VERIFY EXISTING CONDITIONS PRIOR TO COMMENCING ANY WORK. PROVIDE THE ADDITIONAL STRUCTURAL SUPPORT TO SUPPORT CONDUITS.
6	EXISTING ELECTRICAL SWITCHBOARD-SQ.D. 1200AMP, 120/208.3-PHASE, 4W, 3-SECTION. FIELD VERIFY EXISTING LOCATION PRIOR TO ANY WORK.
7	PROPOSED CONDUIT ROUTE. SUPPORT FROM EXISTING STRUCTURAL.
8	CONTRACTOR IS RESPONSIBLE TO VERIFY ALL UNDERGROUND UTILITIES PRIOR TO ANY WORK.
9	STUB UP 24" OR TO AN ACCESSIBLE LOCATION. FIELD VERIFY EXISTING CONDITIONS PRIOR TO ANY WORK.
10	CONTRACTOR SHALL INCLUDE ALL COST TO BORE EXISTING SURFACE. FIELD COORDINATE EXISTING UTILITIES PRIOR TO ANY WORK.
11	CONDUIT ABOVE EXISTING CEILING.
12	ROUTE CONDUIT DOWN TO STUB OUT AT AN ACCESSIBLE LOCATION. FIELD VERIFY EXISTING CONDITIONS.



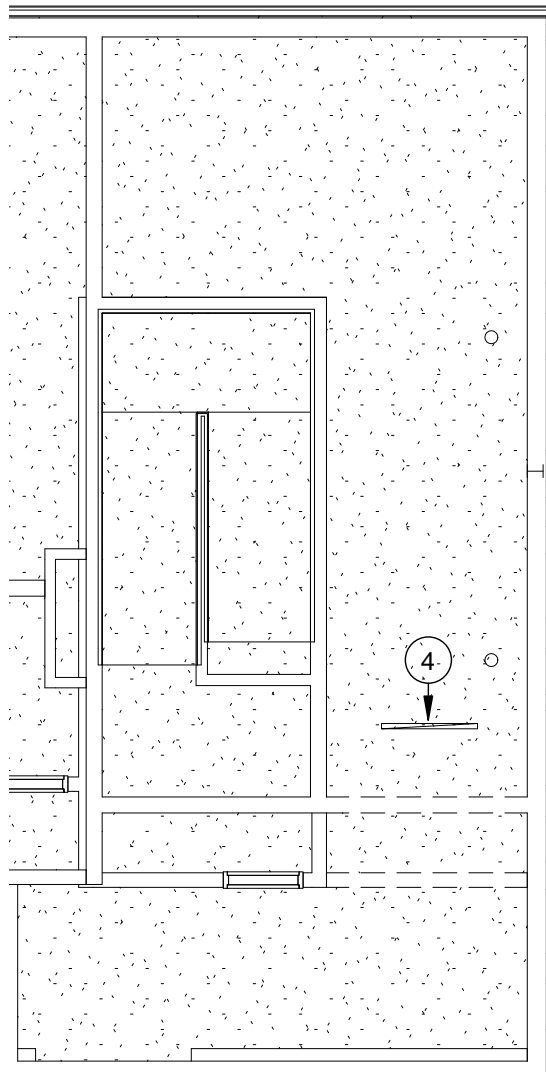
1 ELECTRICAL LIGHTING PLAN - DEMO
ED1.0 SCALE: 3/32" = 1'-0" REF:

- GENERAL NOTES- DEMOLITION
- A. COORDINATE EXACT LOCATION AND MOUNTING HEIGHT OF ALL POWER SOURCE WIRING IN ACCORDANCE WITH ARCHITECTURAL MILLWORK.
 - B. PROVIDE CLEAR VANDAL COVER WITH STOPPER II OPTION FOR ALL FIRE ALARM PULL STATIONS.
 - C. EQUIPMENT AS FURNISHED OF A SINGLE MANUFACTURER.
 - D. COORDINATE EXACT LOCATION OF ALL MECHANICAL EQUIPMENT IN ACCORDANCE MECHANICAL DRAWINGS.
 - E. ALL CONDUITS SHALL REAMED AND COMPLETED WITH CONNECTORS AND INSULATED BUSHINGS AT BOTH ENDS.
 - F. ALL DEVICES SHOWN ON DRAWINGS ARE SYMBOLIC ONLY. THE ENTIRE FIRE ALARM SYSTEM, SHALL BE IN FULL COMPLIANCE AND MEET ALL CODES AND REQUIREMENTS OF THE LOCAL ADMINISTRATIVE AUTHORITY. ANY MODIFICATIONS REQUIRED TO PROVIDE COMPLIANCE SHALL BE MADE AT NO ADDITIONAL COST TO THE OWNER OR ARCHITECT/ENGINEER.
 - G. FIRE ALARM LICENSE HOLDER SHALL ASSUME ALL RESPONSIBILITY FOR DESIGN AND SUBMIT DRAWINGS TO JURISDICTION HAVING AUTHORITY AND ABIDE BY ALL OTHER REQUIREMENTS PER NFPA.
 - H. ALL SPECIAL SYSTEM CONDUITS SHALL BE STUBBED UP ABOVE THE CEILING LEVEL. IF CABLE TRAY IS PRESENT, STUBBED CONDUITS TO CABLE TRAY.

ELECTRICAL KEYNOTES	
1	EXISTING LIGHT FIXTURES TO BE REPLACE WITH NEW LED FIXTURES ONLY IF ALTERNATE #2 IS ACOPECTED. REUSE EXISTING LOCATION AND LIGHTING CIRCUIT AND EXPAND EXISTING LIGHTING CIRCUIT AS NEEDED WITH 2#10, 1#10G, 3/4"C. FIELD VERIFY EXISTING LOCATIONS.
2	EXISTING CANOPY LIGHTS TO BE REMOVED.
3	EXISTING BUILDING EXTERIOR WALL MOUNTED FIXTURE TO REMAIN.
4	EXISTING LIGHTING TO BE REMOVED. FIELD VERIFY EXISTING CONDITIONS.



3 ELECTRICAL LIGHTING PLAN 2ND FLOOR- DEMO - ENLARGEMENT
ED1.0 SCALE: 1/8" = 1'-0" REF:



2 ELECTRICAL LIGHTING PLAN 1ST FLOOR - DEMO - ENLARGEMENT
ED1.0 SCALE: 1/8" = 1'-0" REF: ED1.0

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PH: 512.474.6526
FAX: 512.474.6761
204 E. STUBBS
STREET
EDINBURG, TX
PH: 281.956.3864.0611
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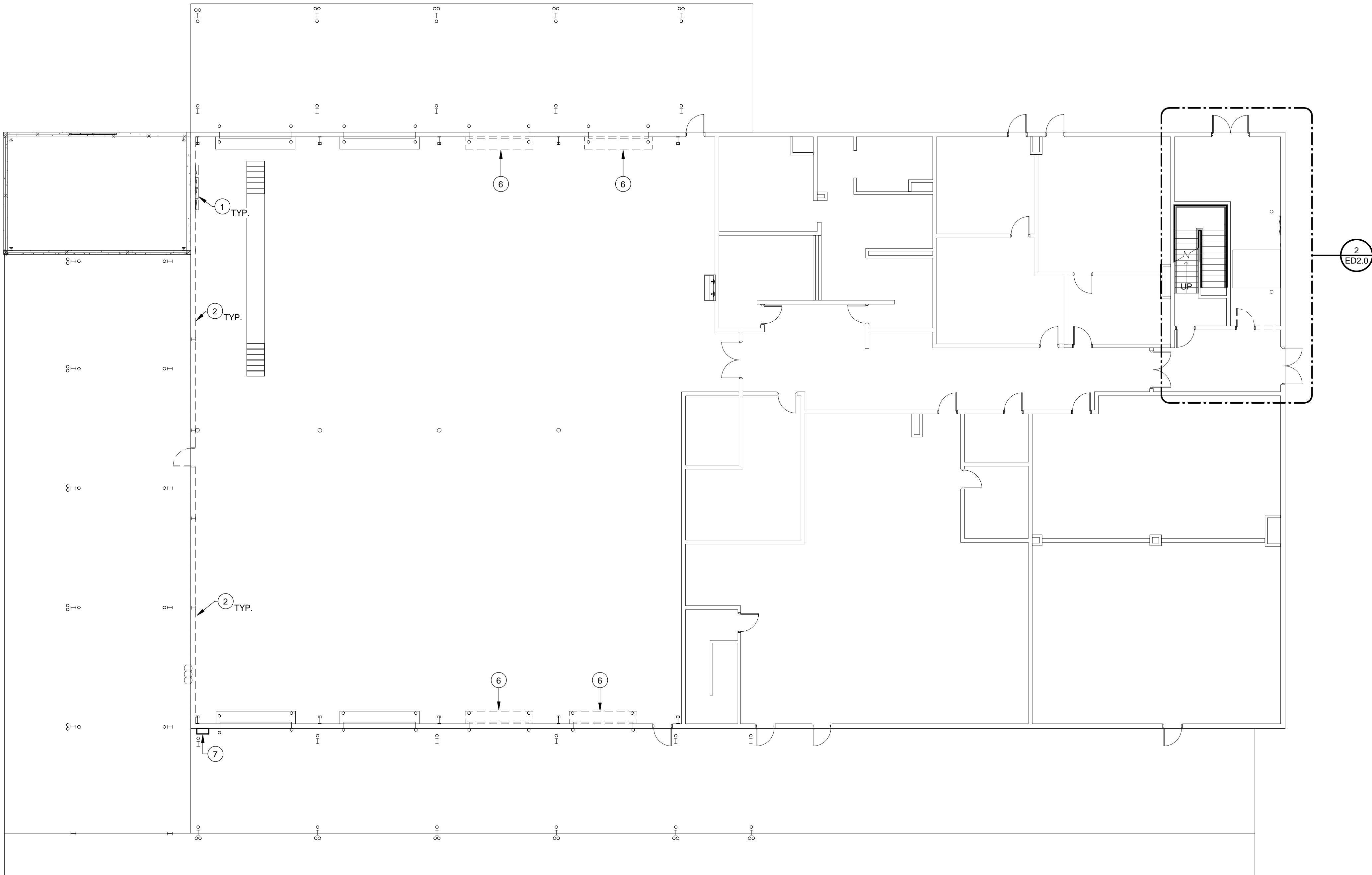
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ELECTRICAL
LIGHTING DEMO
FLOOR PLAN

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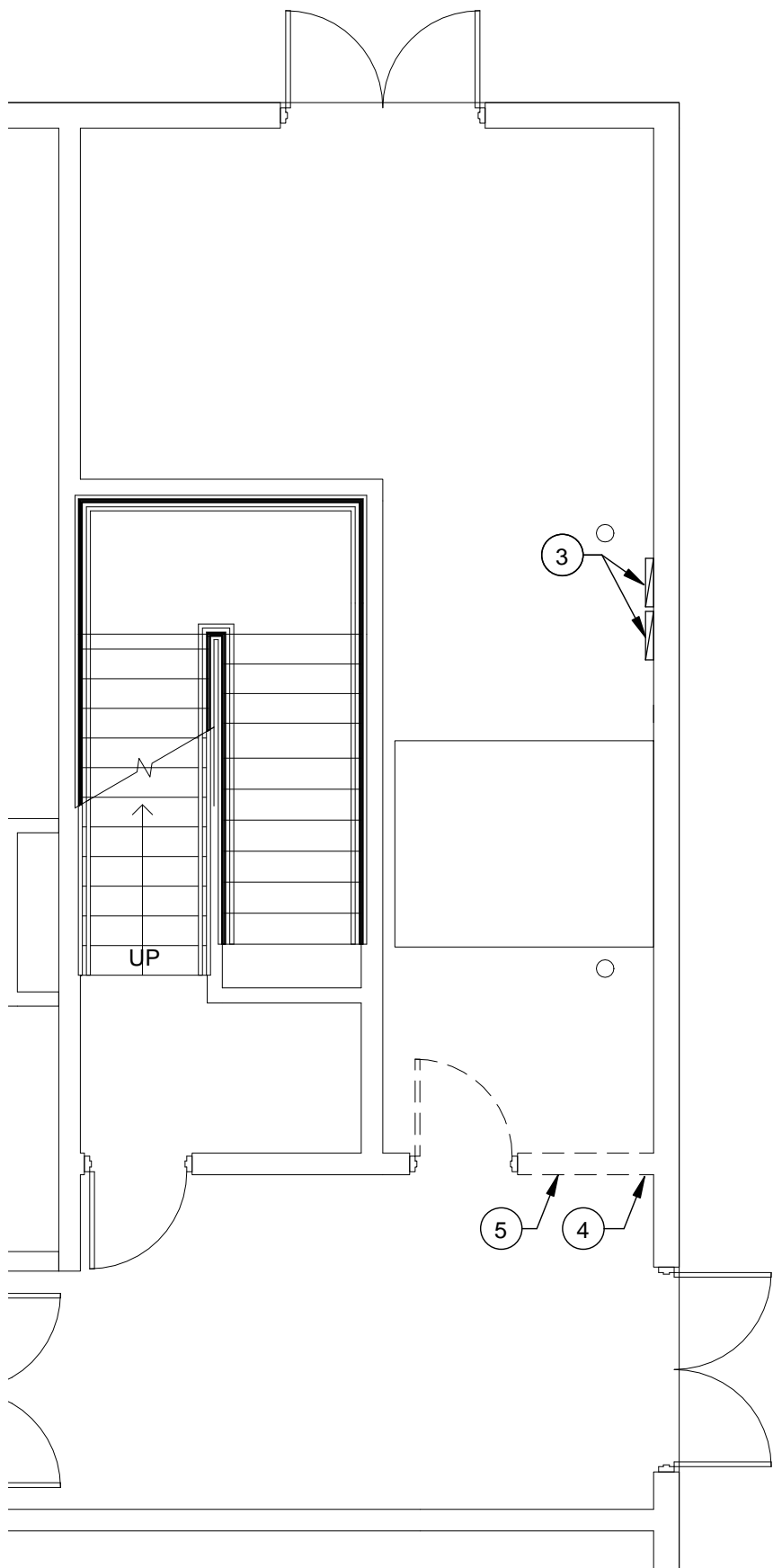
1
ED2.0 ELECTRICAL POWER FLOOR PLAN - DEMO
SCALE: 3/32" = 1'-0" REF.

GENERAL ELECTRICAL - DEMOLITION NOTES

- A. THE EXTENT OF DEMOLITION WORK IS INDICATED ON THE ARCHITECTURAL DRAWINGS AND BY THE REQUIREMENTS OF THIS SECTION. A VISIT TO THE SITE WILL BE REQUIRED TO PROPERLY BID THE DEMOLITION WORK.
- B. PROVIDE ALL DEMOLITION WORK REQUIRED FOR THE REMOVAL AND/OR RELOCATION OF ELECTRICAL EQUIPMENT AND ASSOCIATED CONDUCTORS, CONDUIT, BOXES, ETC. TO PROVIDE A COMPLETE AND OPERABLE SYSTEM UPON COMPLETION OF THE PROJECT.
- C. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE TO REVIEW THE ARCHITECTURAL DOCUMENTS IN ADDITION TO THE DIVISION 15 AND 16 DOCUMENTS TO DETERMINE THE COMPLETE SCOPE OF WORK.
- D. WHERE DEVICES OR EQUIPMENT ARE INDICATED OR REQUIRED TO BE REMOVED, THE ASSOCIATED BOXES, CONDUIT, AND CONDUCTORS SHALL BE REMOVED BACK TO THEIR SOURCE.
- E. WHERE DEVICES OR EQUIPMENT ARE INDICATED OR REQUIRED TO BE RELOCATED, THE ASSOCIATED BOXES, CONDUIT, AND CONDUCTORS SHALL BE REMOVED BACK TO A CONCEALED JUNCTION BOX AND NEW PRODUCTS SHALL BE USED TO EXTEND THE SERVICE TO THE NEW LOCATION.
- F. WHERE CONDUITS RUN ABOVE INACCESSIBLE CEILINGS OR IN WALLS WHICH ARE NOT PART OF DEMOLITION ARE TO REMAIN UNDISTURBED, CONDUCTORS SHALL BE REMOVED AND THE CONDUITS CAPPED AND ABANDONED.
- G. WHERE THE REMOVAL OF DEVICES OR EQUIPMENT RENDERS EQUIPMENT DOWNSTREAM INOPERABLE, SERVICE SHALL BE EXTENDED TO THE DOWNSTREAM DEVICE OR EQUIPMENT SO THAT THE DEVICE OR EQUIPMENT IS LEFT IN OPERATING CONDITION.
- H. COORDINATE DEMOLITION OF DIVISION 16 SYSTEMS AS REQUIRED WITH ALL OTHER TRADES.
- I. ALL EXISTING ELECTRICAL EQUIPMENT, CONDUIT AND WIRING REMOVED DURING CONSTRUCTION NO LONGER REQUIRED AS PART OF AN ACTIVE SYSTEM AND NOT TO BE REUSED SHALL BE REMOVED FROM THE JOB SITE AND PROPERLY RETURNED TO THE OWNER, IF DESIRED BY OWNER.
- J. WHERE EXISTING EQUIPMENT IS TO BE RELOCATED, EXTREME CARE SHALL BE TAKEN TO PREVENT DAMAGE DURING THE REMOVAL AND REINSTALLATION. WHERE DAMAGE OCCURS, THE EQUIPMENT SHALL BE REPLACED OR REPAIRED TO THE SATISFACTION AND APPROVAL OF THE ARCHITECT AT NO ADDITIONAL COST TO THE OWNER.
- K. EXISTING DEVICES AND/OR EQUIPMENT TO BE REUSED SHALL BE CLEANED AND REPAIRED AT THE DISCRETION OF THE ARCHITECT WHERE APPLICABLE.
- L. ALL DEVICES WITH AN 'EX' SYMBOL ARE EXISTING TO REMAIN.
- M. ALL DEVICES ATTACHED TO WALLS OR CEILINGS SHALL BE REMOVED PER DEMOLITION NOTE A - L WHETHER SHOWN ON DRAWINGS OR NOT.

ELECTRICAL KEYNOTES

1	EXISTING ELECTRICAL PANELS TO REMAIN. FIELD VERIFY EXISTING CONDITIONS PRIOR TO ANY WORK.
2	REMOVE EXISTING ELECTRICAL ON WALL TO BE REMOVED. FIELD VERIFY EXISTING CONDITIONS.
3	EXISTING ELECTRICAL PANELS TO REMAIN. FIELD VERIFY EXISTING LOCATION.
4	EXISTING INTRUSION SECURITY WALL SENSOR TO BE REPLACED WITH NEW CEILING SENSOR.
5	EXISTING ELECTRICAL TO TIME CLOCK TO BE REMOVED. TIMECLOCK TO BE RETURNED TO OWNER.
6	EXISTING ELECTRICAL TO OVERHEAD DOOR SHALL BE REMOVED.
7	EXISTIGN EMERGENCY PUMP SHUT OFF SWITCH TO REMAIN. FIELD VERIFY EXISTING LOCATION.



2
ED2.0 ELECTRICAL POWER FLOOR PLAN - DEMO - ENLARGEMENT
SCALE: 3/16" = 1'-0" REF: ED2.0

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FAX: 512.474.6761
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STREET
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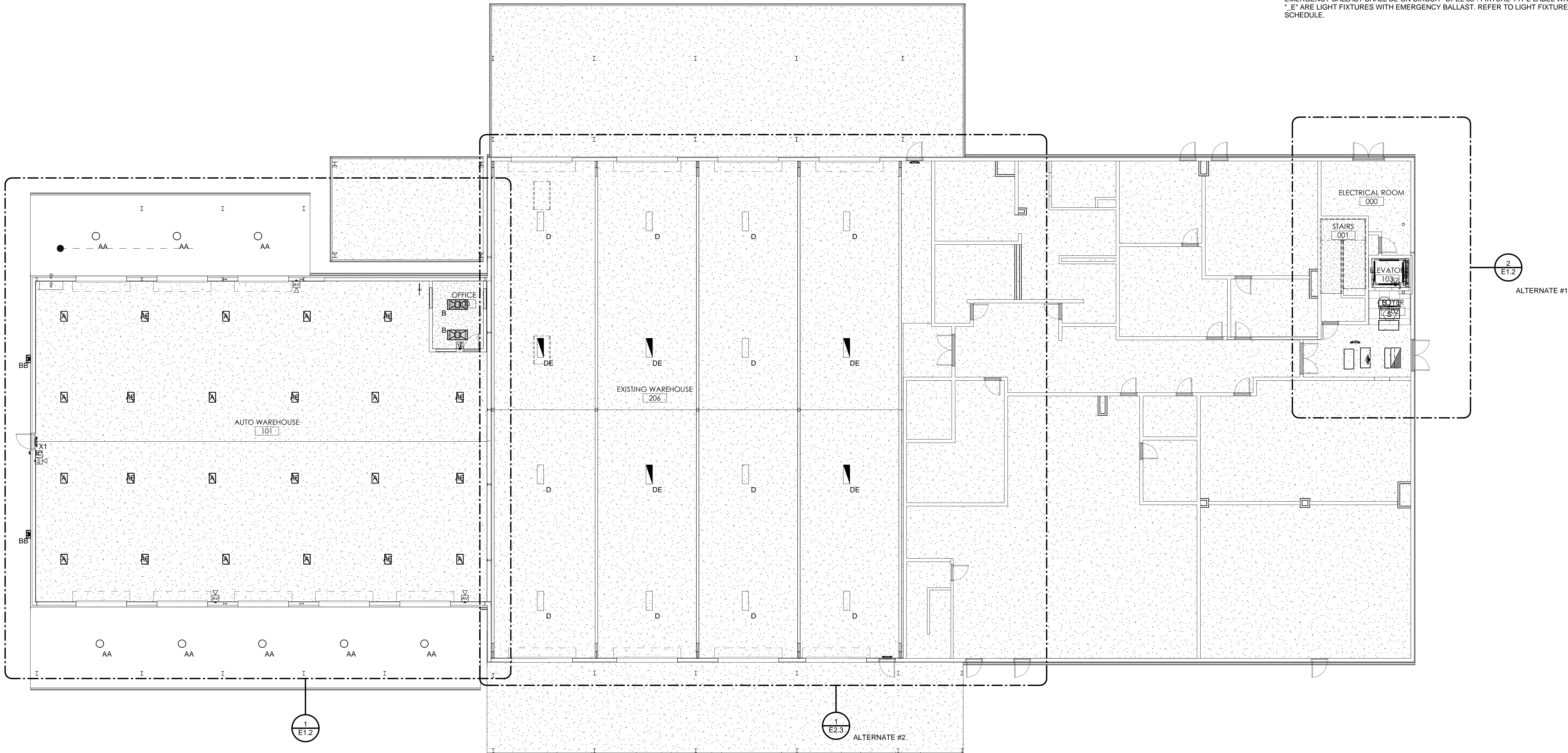
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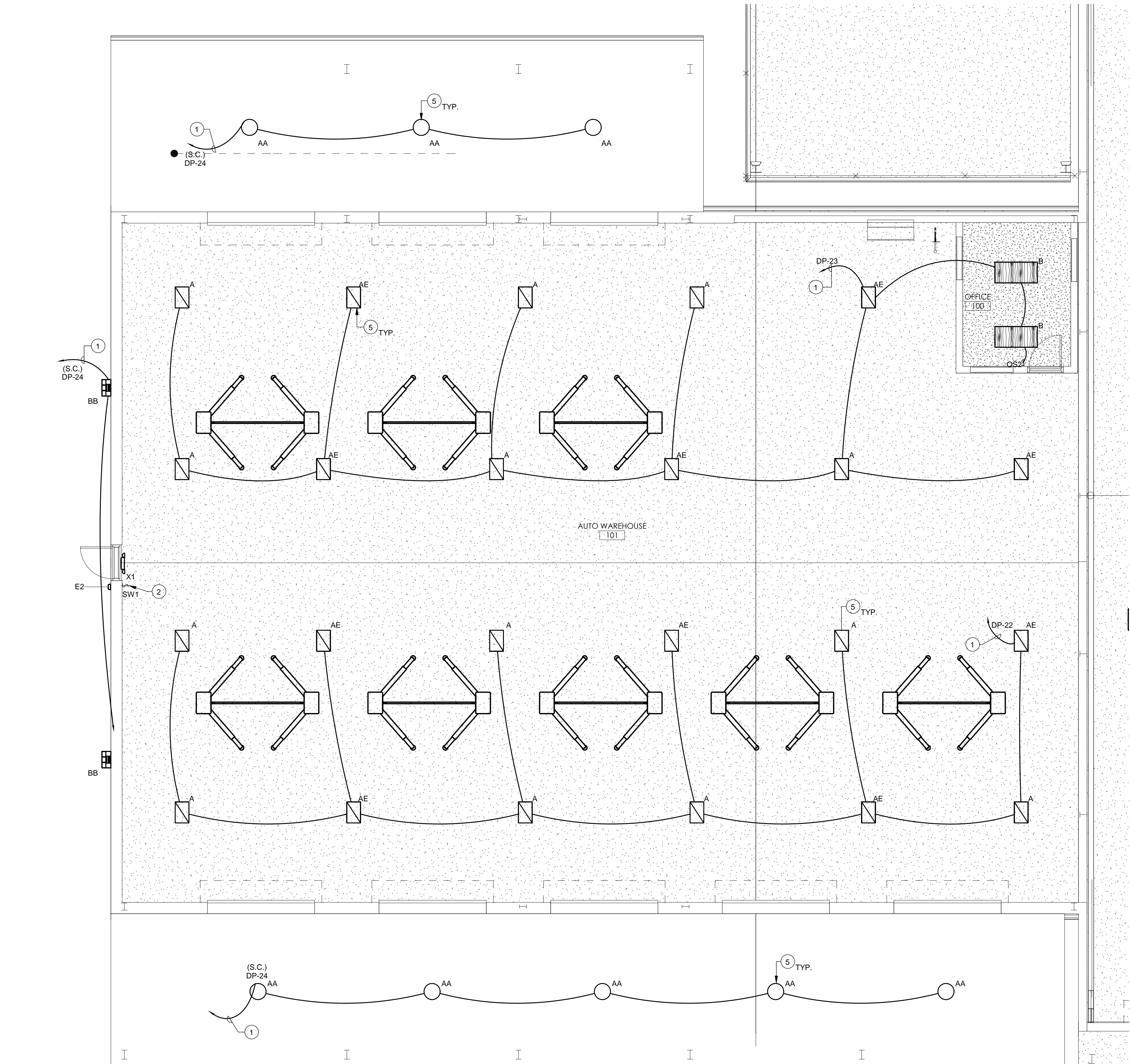
ELECTRICAL
POWER DEMO
FLOOR PLAN

ED2.0



- GENERAL NOTES- LIGHTING
- A. ALL EXIT FIXTURES/EMERGENCY BATTERY PACK LIGHT FIXTURE SHALL BE CONNECTED TO UNSWITCHED OR NON-DIMMING HOT LEG OF SAME VOLTAGE/PHASE OF LOCAL LIGHTING CIRCUIT IN SPACE.
- A. ALL EXIT FIXTURES/EMERGENCY BATTERY PACK LIGHT FIXTURE SHALL BE CONNECTED TO UNSWITCHED OR NON-DIMMING HOT LEG OF SAME VOLTAGE/PHASE OF LOCAL LIGHTING CIRCUIT IN SPACE.
- B. VERIFY CEILING TYPES AND COORDINATE WITH FIXTURE TYPE LIGHT FIXTURE SHALL BE COMPATIBLE WITH CEILING TYPE AS INDICATED ON THE ARCHITECTURAL DOCUMENTS. NOTIFY ENGINEER IF DISCREPANCIES EXIST PRIOR TO ORDERING FIXTURES.
- C. COORDINATE EXACT ROUTING OF ALL CONDUIT ABOVE CEILING IN BUILDING. TYPICAL FOR ALL BUILDING EXTERIOR LIGHTING.
- D. COORDINATE LOCATION OF LIGHTS WITH DIFFUSERS AND GRILLES.
- E. SWITCH LEGS ARE NOT SHOWN WHERE SWITCHING SCHEME IS OBVIOUS.
- F. ALL EXIT FIXTURES TYPE-"X1 & X2", EMERGENCY LIGHT FIXTURE TYPE-"E" AND ALL EMERGENCY BALLAST SHALL BE ON CIRCUIT "DPEL-38". FIXTURE TYPE LABEL WITH AN "E" ARE LIGHT FIXTURES WITH EMERGENCY BALLAST. REFER TO LIGHT FIXTURE SCHEDULE.

1 ELECTRICAL LIGHTING PLAN - OVERALL FIRST FLOOR
E1.1 SCALE: 3/32" = 1'-0" REF:

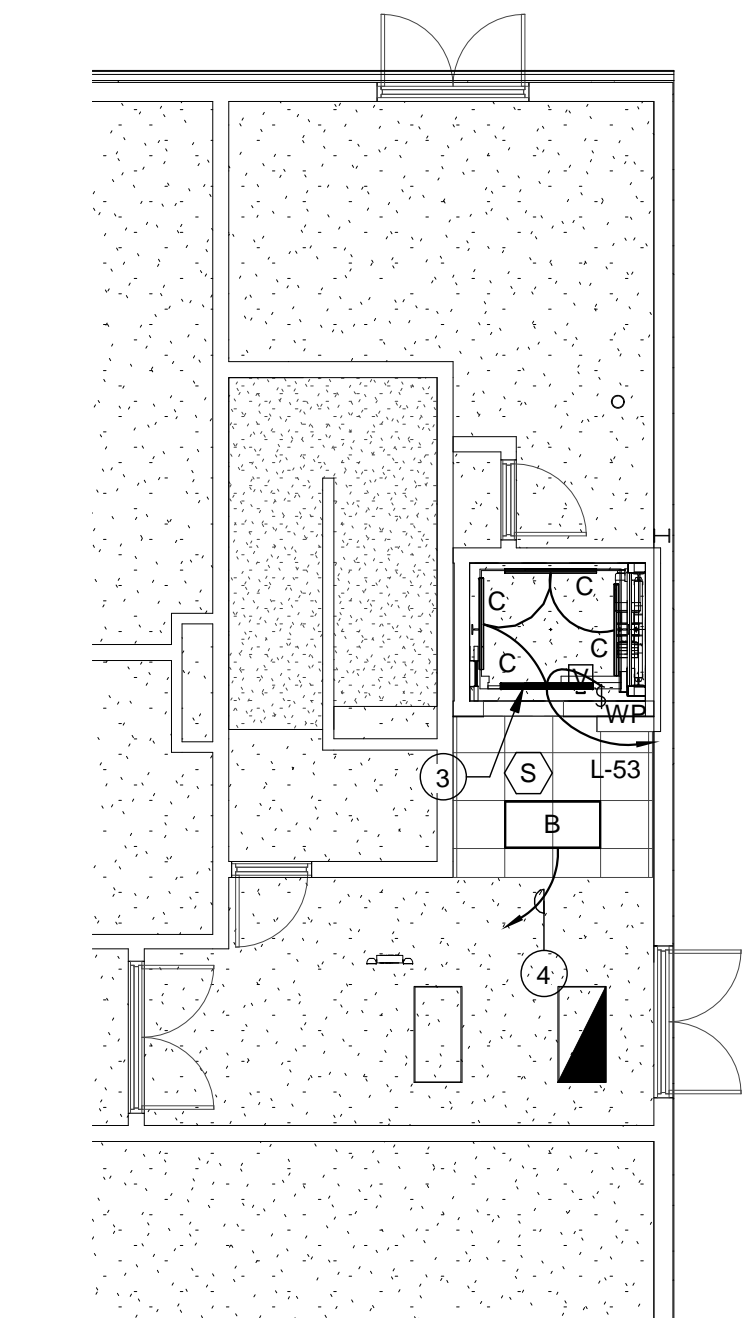


1
E1.2

ELECTRICAL LIGHTING PLAN - FIRST FLOOR -
ENLARGEMENT
SCALE: 3/16" = 1'-0" REF: E1.1

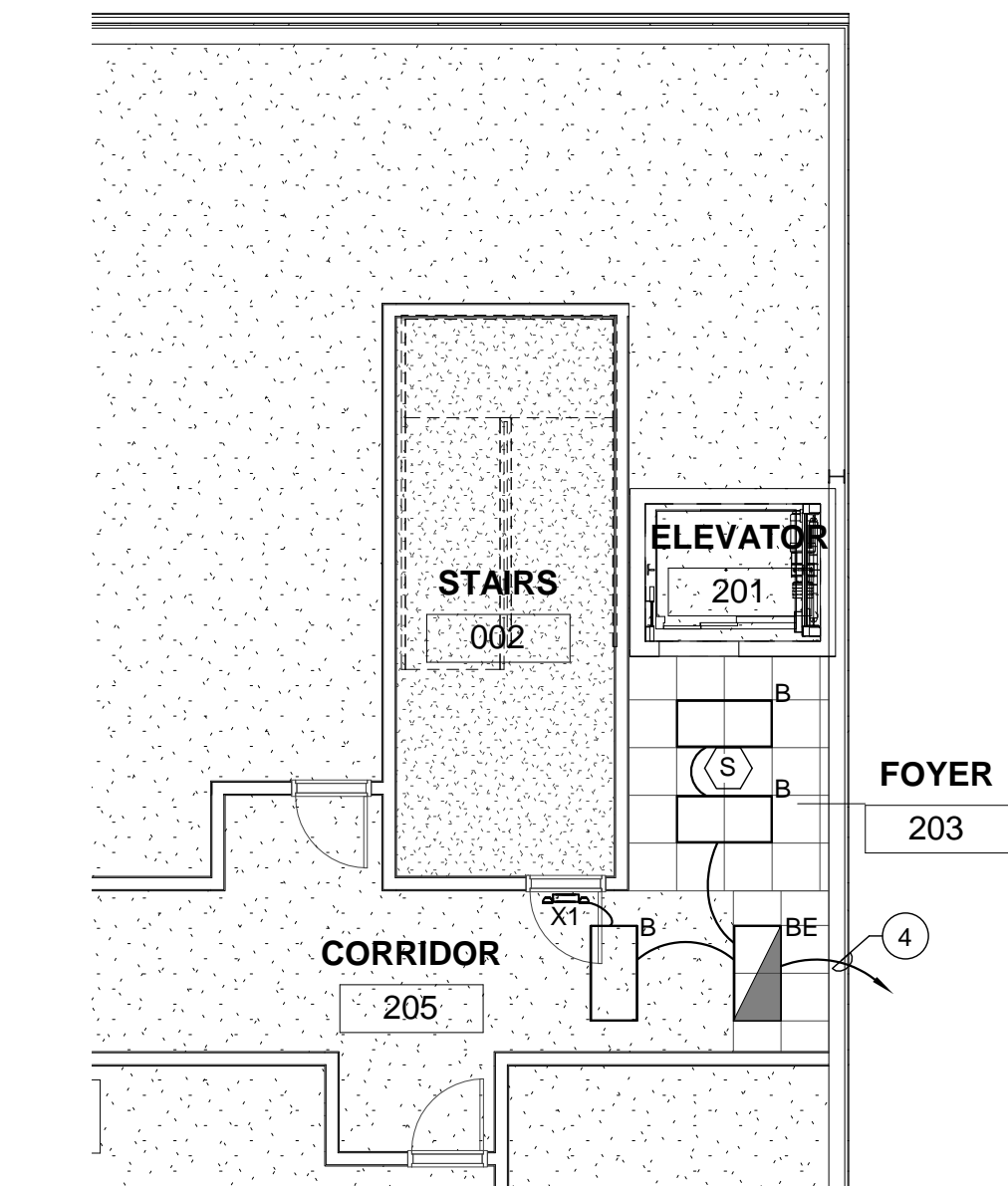
- GENERAL NOTES- LIGHTING
- A. ALL EXIT FIXTURES/EMERGENCY BATTERY PACK LIGHT FIXTURE SHALL BE CONNECTED TO UNSWITCHED OR NON-DIMMING HOT LEG OF SAME VOLTAGE/PHASE OF LOCAL LIGHTING CIRCUIT IN SPACE.
A. ALL EXIT FIXTURES/EMERGENCY BATTERY PACK LIGHT FIXTURE SHALL BE CONNECTED TO UNSWITCHED OR NON-DIMMING HOT LEG OF SAME VOLTAGE/PHASE OF LOCAL LIGHTING CIRCUIT IN SPACE.
- B. VERIFY CEILING TYPES AND COORDINATE WITH FIXTURE TYPE LIGHT FIXTURE SHALL BE COMPATIBLE WITH CEILING TYPE AS INDICATED ON THE ARCHITECTURAL DOCUMENTS. NOTIFY ENGINEER IF DISCREPANCIES EXIST PRIOR TO ORDERING FIXTURES.
- C. COORDINATE EXACT ROUTING OF ALL CONDUIT ABOVE CEILING IN BUILDING. TYPICAL FOR ALL BUILDING EXTERIOR LIGHTING.
- D. COORDINATE LOCATION OF LIGHTS WITH DIFFUSERS AND GRILLES.
- E. SWITCH LEGS ARE NOT SHOWN WHERE SWITCHING SCHEME IS OBVIOUS.
- F. ALL EXIT FIXTURES TYPE-"X1 & X2", EMERGENCY LIGHT FIXTURE TYPE-"E" AND ALL EMERGENCY BALLAST SHALL BE ON CIRCUIT "DPEL-38". FIXTURE TYPE LABEL WITH AN "E" ARE LIGHT FIXTURES WITH EMERGENCY BALLAST. REFER TO LIGHT FIXTURE SCHEDULE.

ELECTRICAL KEYNOTES	
1	SHALL BE CONTROLLED VIA LIGHTING CONTROL PANEL 'LCP1'. REFER TO RISER AND SPECIFICATION FOR ADDITIONAL INFORMATION.
2	PROVIDE DIGITAL OVERRIDE SWITCH FOR LIGHTING RELAY PANEL. PROGRAM SWITCH WITH TIME AND/OR DIM FUNCTIONS PER OWNER DIRECTIONS.
3	NEW LIGHT FIXTURE LOCATED IN PIT AREA. FIELD VERIFY EXACT LOCATION, COORDINATE WITH EQUIPMENT.
4	NEW LIGHTING. TIE INTO EXISTING LIGHTING CIRCUIT WITH 2#12, 1#12G, 1/2" C.
5	LIGHT FIXTURE TO BE SURFACE MOUNTED, PROVIDE THE ADDITIONAL STRUCTURAL TO SUPPORT FIXTURE.



2
E1.2

ELECTRICAL LIGHTING PLAN -
FIRST FLOOR - ALTERNATE #1
SCALE: 1/8" = 1'-0" REF: E1.1



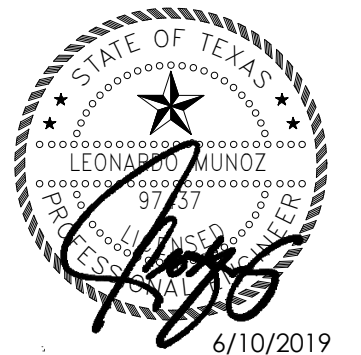
3
E1.2

ELECTRICAL LIGHTING PLAN - SECOND FLOOR
ALTERNATE #1
SCALE: 1/8" = 1'-0" REF:

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PH: 512.474.6526
FAX: 512.474.6761
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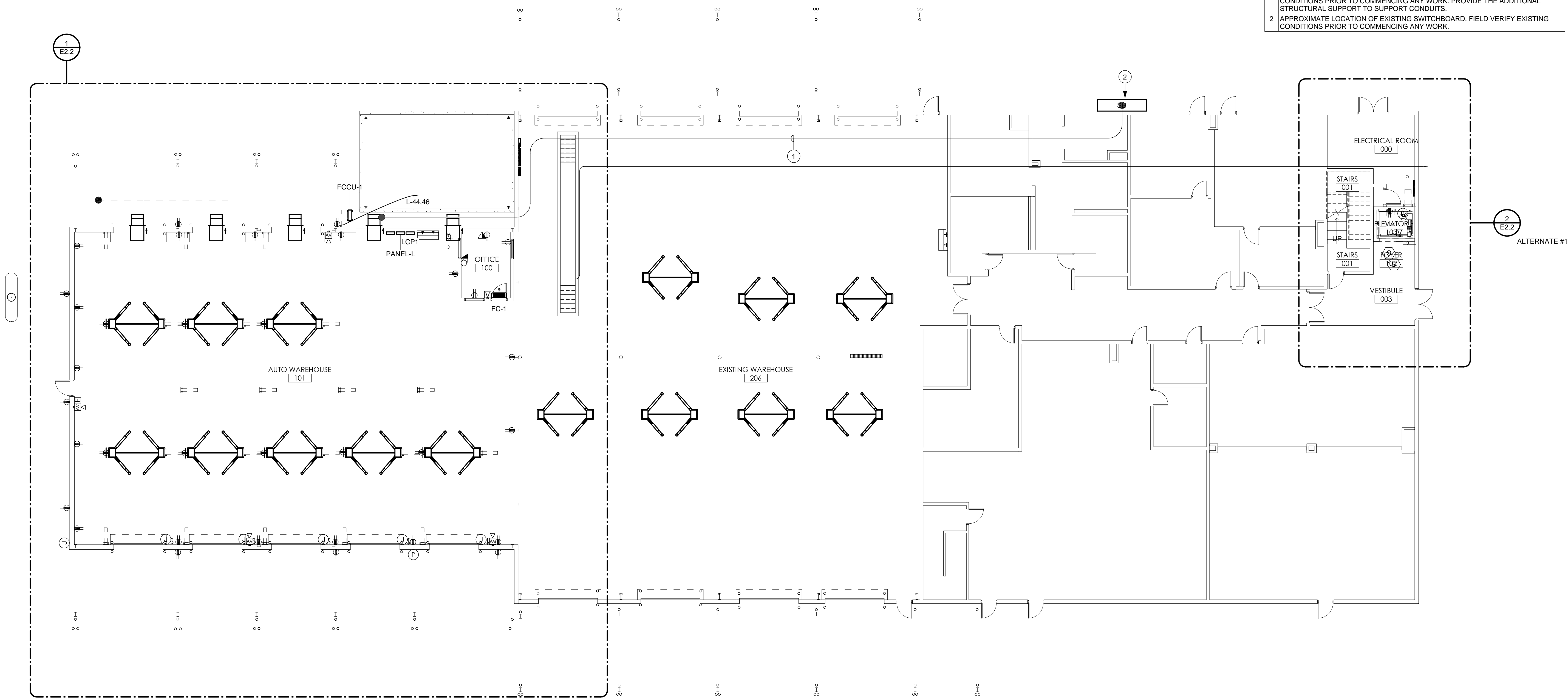
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ELECTRICAL
LIGHTING FLOOR
PLANS

E1.2



1
E2.1
ELECTRICAL POWER FLOOR
PLAN - OVERALL FIRST FLOOR
SCALE: 3/32" = 1'-0" REF:

GENERAL NOTES- POWER

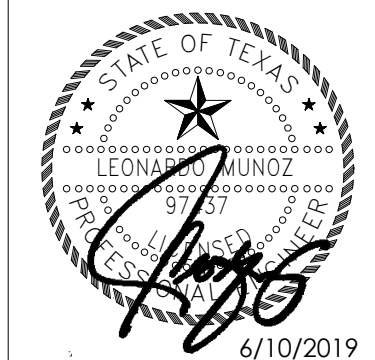
- COORDINATE EXACT LOCATION AND MOUNTING HEIGHT OF ALL POWER SOURCE WIRING IN ACCORDANCE WITH ARCHITECTURAL MILLWORK.
- ELECTRICAL CONTRACTOR SHALL MAKE FINAL CONNECTION TO H.V.A.C EQUIPMENT, PLUMBING EQUIPMENT, REFER TO PANEL SCHEDULE FOR WIRE SIZE.
- ELECTRICAL CONTRACTOR SHALL PROVIDE STARTERS, RELAYS, CONTACTORS AND THE REQUIRED ELECTRICAL ACCESSORIES FOR MECHANICAL SYSTEM AS REQUIRED.
- COORDINATE EXACT LOCATION OF ALL MECHANICAL EQUIPMENT IN ACCORDANCE W/MECHANICAL DRAWINGS TO MEET ELECTRICAL AND MECHANICAL REQUIRED CLEARANCE BY THE LATEST CODE.
- ELECTRICAL CONTRACTOR SHALL PROVIDE J-BOX AND CONDUIT FOR H.V.A.C. CONTROLS AND THERMOSTATS. COORDINATE EXACT LOCATION WITH MECHANICAL CONTRACTOR.
- NEMA RATED OUTLETS, REFER TO BREAKER SIZE AND COORDINATE WITH EQUIPMENT REQUIREMENTS PRIOR TO BID.
- ALL DEVICES SHOWN ON DRAWINGS ARE SYMBOLIC ONLY. THE ENTIRE FIRE ALARM SYSTEM, SHALL BE IN FULL COMPLIANCE AND MEET ALL CODES AND REQUIREMENTS OF THE LOCAL ADMINISTRATIVE AUTHORITY. ANY MODIFICATIONS REQUIRED TO PROVIDE COMPLIANCE SHALL BE MADE AT NO ADDITIONAL COST TO THE OWNER OR ARCHITECT/ENGINEER.
- FIRE ALARM LICENSE HOLDER SHALL ASSUME ALL RESPONSIBILITY FOR DESIGN AND SUBMIT DRAWINGS TO JURISDICTION HAVING AUTHORITY AND ABIDE BY ALL OTHER REQUIREMENTS PER NFPA.

ELECTRICAL KEYNOTES

- | | |
|---|--|
| 1 | COORDINATE EXACT CONDUIT ROUTING IN THE FIELD. FIELD VERIFY EXISTING CONDITIONS PRIOR TO COMMENCING ANY WORK. PROVIDE THE ADDITIONAL STRUCTURAL SUPPORT TO SUPPORT CONDUITS. |
| 2 | APPROXIMATE LOCATION OF EXISTING SWITCHBOARD. FIELD VERIFY EXISTING CONDITIONS PRIOR TO COMMENCING ANY WORK. |

11720 NORTH IH35
AUSTIN, TEXAS 78753
PH: 512.474.6526
FAX: 512.474.6761
204 E. STUBBS
STREET
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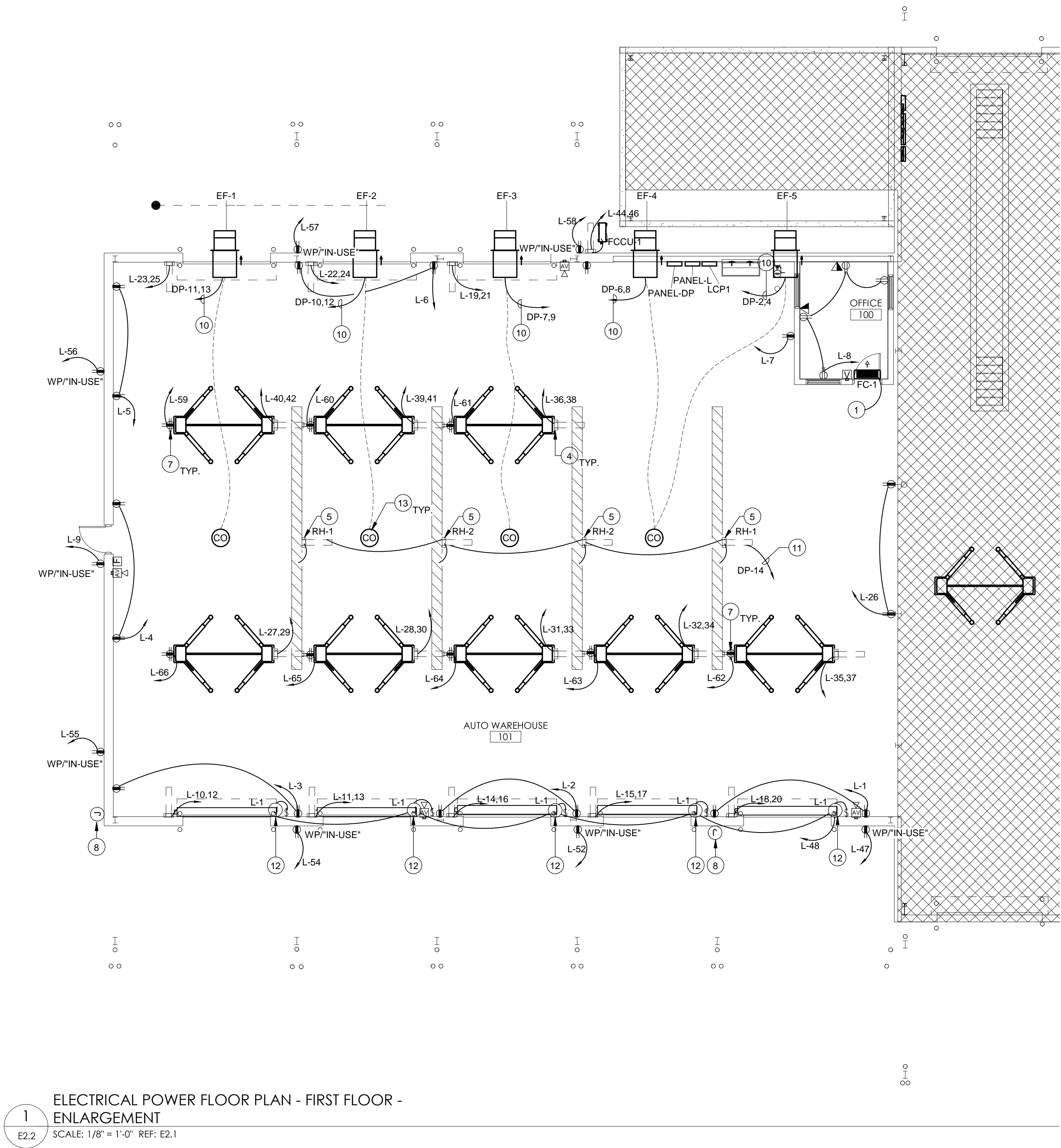
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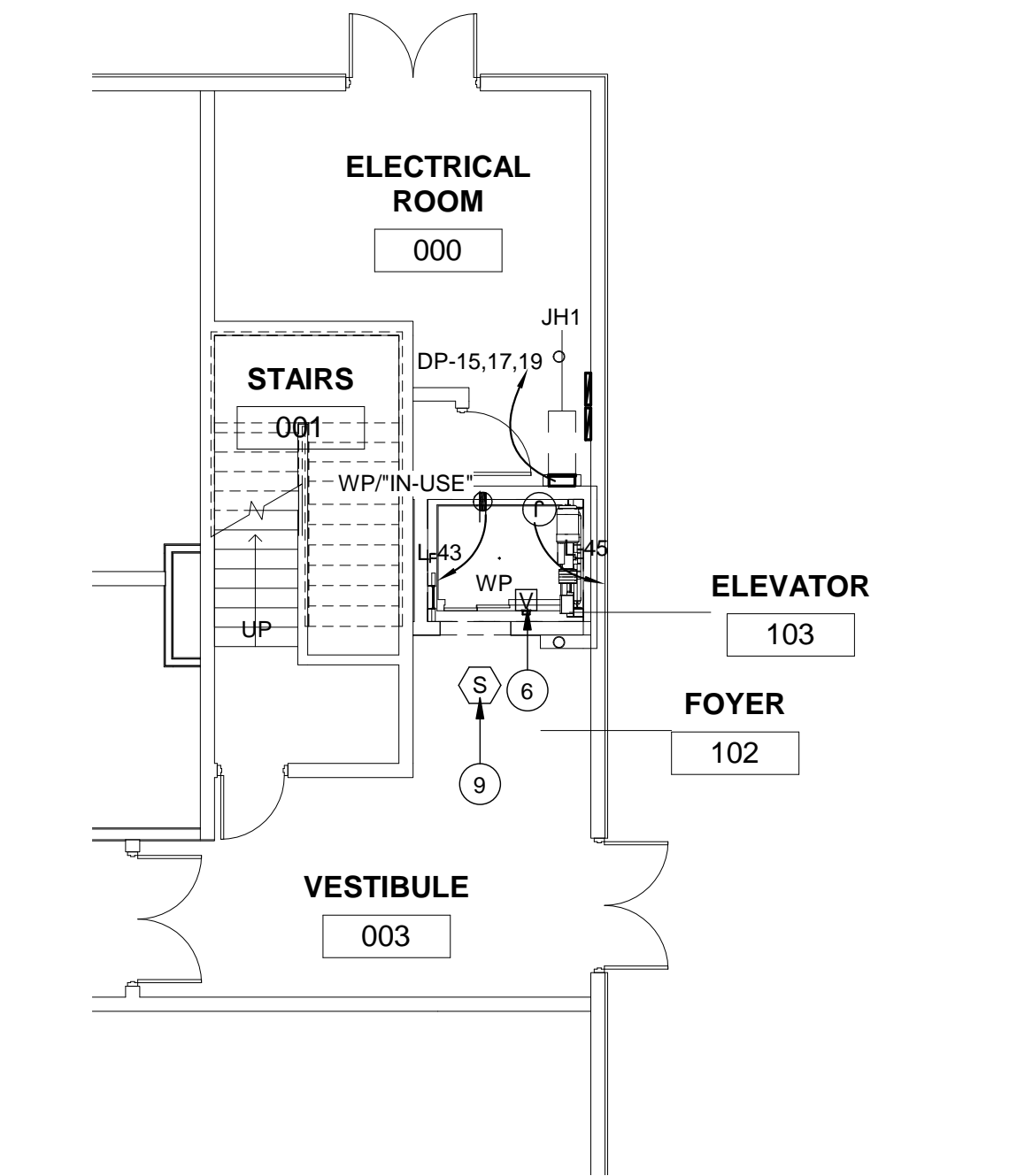
ELECTRICAL
POWER FLOOR
PLAN

E2.1

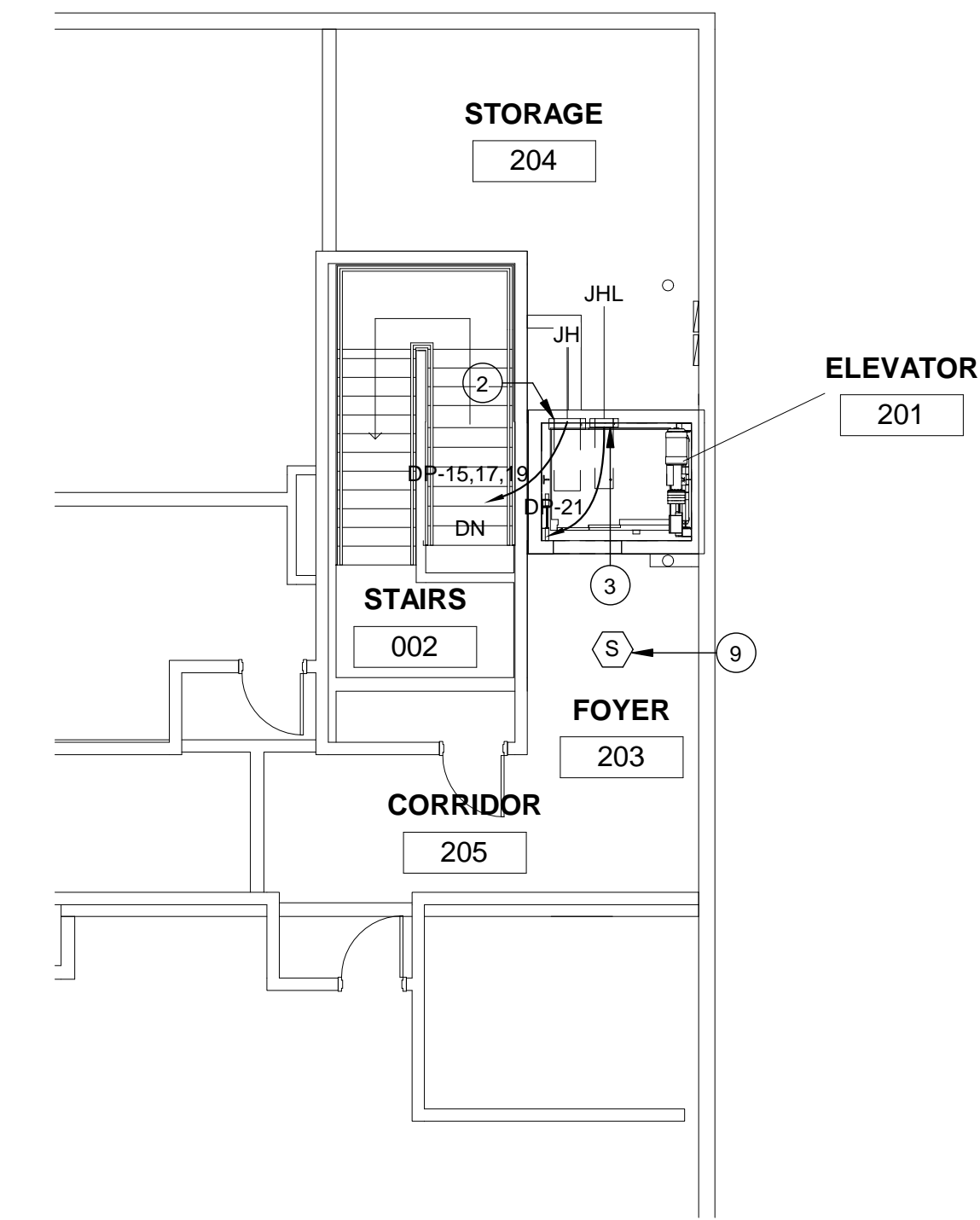
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1
E2.2 ELECTRICAL POWER FLOOR PLAN - FIRST FLOOR - ENLARGEMENT
SCALE: 1/8" = 1'-0" REF: E2.1



2
E2.2 ELECTRICAL POWER FLOOR PLAN - ALTERNATE#1
SCALE: 1/8" = 1'-0" REF: E2.1



3
E2.2 ELECTRICAL SECOND FLOOR PLAN - ALTERNATE #1
SCALE: 1/8" = 1'-0" REF:

- GENERAL NOTES- POWER
- COORDINATE EXACT LOCATION AND MOUNTING HEIGHT OF ALL POWER SOURCE WIRING IN ACCORDANCE WITH ARCHITECTURAL MILLWORK.
 - ELECTRICAL CONTRACTOR SHALL MAKE FINAL CONNECTION TO H.V.A.C EQUIPMENT, PLUMBING EQUIPMENT, REFER TO PANEL SCHEDULE FOR WIRE SIZE.
 - ELECTRICAL CONTRACTOR SHALL PROVIDE STARTERS, RELAYS, CONTACTORS AND THE REQUIRED ELECTRICAL ACCESSORIES FOR MECHANICAL SYSTEM AS REQUIRED.
 - COORDINATE EXACT LOCATION OF ALL MECHANICAL EQUIPMENT IN ACCORDANCE W/MECHANICAL DRAWINGS TO MEET ELECTRICAL AND MECHANICAL REQUIRED CLEARANCE BY THE LATEST CODE.
 - ELECTRICAL CONTRACTOR SHALL PROVIDE J-BOX AND CONDUIT FOR H.V.A.C. CONTROLS AND THERMOSTATS. COORDINATE EXACT LOCATION WITH MECHANICAL CONTRACTOR.
 - NEMA RATED OUTLETS, REFER TO BREAKER SIZE AND COORDINATE WITH EQUIPMENT REQUIREMENTS PRIOR TO BID.
 - ALL DEVICES SHOWN ON DRAWINGS ARE SYMBOLIC ONLY. THE ENTIRE FIRE ALARM SYSTEM, SHALL BE IN FULL COMPLIANCE AND MEET ALL CODES AND REQUIREMENTS OF THE LOCAL ADMINISTRATIVE AUTHORITY. ANY MODIFICATIONS REQUIRED TO PROVIDE COMPLIANCE SHALL BE MADE AT NO ADDITIONAL COST TO THE OWNER OR ARCHITECT/ENGINEER.
 - FIRE ALARM LICENSE HOLDER SHALL ASSUME ALL RESPONSIBILITY FOR DESIGN AND SUBMIT DRAWINGS TO JURISDICTION HAVING AUTHORITY AND ABIDE BY ALL OTHER REQUIREMENTS PER NFPA.

ELECTRICAL KEYNOTES	
1	INTERLOCK FCCU WITH FC H.V.A.C. EQUIPMENT. WIRING SHALL BE 3#10, 1#10G, 3/4"C.
2	DISCONNECT 'JH' FOR ELEVATOR. ELECTRICAL CONTRACTOR TO COORDINATE EXACT LOCATION AND ALL REQUIRED ELECTRICAL CONNECTIONS WITH ELEVATOR MANUFACTURER PRIOR TO COMMENCING ANY WORK.
3	DISCONNECT 'JHL' FOR ELEVATOR. ELECTRICAL CONTRACTOR TO COORDINATE EXACT LOCATION AND ALL REQUIRED ELECTRICAL CONNECTIONS WITH ELEVATOR MANUFACTURER PRIOR TO COMMENCING ANY WORK.
4	REFER TO ELECTRICAL DETAIL FOR DISCONNECT MOUNTING.
5	DISCONNECT HEATERS, MOUNTED ON CEILING STRUCTURAL NEAR HEATER. FIELD VERIFY EXACT LOCATION.
6	FIRE ALARM DEVICE IN THE FIT. FIELD COORDINATE EXACT LOCATION.
7	MOUNT QUAD DUPLEX OUTLET ON VEHICLE LIFT STRUCTURE.
8	PROVIDE J-BOX AND SPEAKER FOR OWNERS INTERCOM SYSTEM. PROVIDE ALL COST IN BID FOR A COMPLETE OPERABLE SYSTEM.
9	NEW FIRE ALARM SMOKE DETECTOR FOR ELEVATOR RECALL SYSTEM. TIE INTO EXISTING FIRE ALARM SYSTEM.
10	SHALL BE CONTROLLED VIA LIGHTING CONTROL PANEL 'LCP1'. REFER TO RISER AND SPECIFICATION FOR ADDITIONAL INFORMATION.
11	SHALL BE CONTROLLED VIA WALL MOUNTED SWITCH AND T-STAT. REFER TO MECHANICAL DOCUMENTS.
12	PROVIDE J-BOX FOR MOTORIZED DAMPER. COORDINATE EXACT LOCATION AND REQUIREMENTS PRIOR TO ANYWORK AND COORDINATE WITH MECHANICAL DOCUMENTS.
13	CARBON MONOXIDE DETECTOR FOR EXHAUST FANS SHALL BE INTERLOCKED WITH FIRE ALARM SYSTEM. COORDINATE ALL WORK WITH EQUIPMENT MANUFACTURER AND FIRE ALARM CONTRACTOR AND COORDINATE WITH MECHANICAL DOCUMENTS.

TRINITY

MEP ENGINEERING
3533 Moreland Dr. Ste A 1 Weslaco, Tx
78596 p:956.973.0500 | f:956-351-5750
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Texas Registered Engineering Firm - F10362
Project number:18.3.39

11720 NORTH IH35
AUSTIN, TEXAS 78753
PH: 512.474.6526
FAX: 512.474.6761
204 E. STUBBS
STREET
EDINBURG, TX
PH: 281.384.0611
FAX: 956.386.0613

NEGRETTE & KOLAR
ARCHITECTS^{LLP}



Project #1809

CITY OF McALLEN
DEPT OF PUBLIC WORKS
AUTO WAREHOUSE EXPANSION
McAllen, Texas

DRAWN BY: Author
ISSUED 6/10/2019
DATE:
REVISION / ADDENDA

NO. DATE DESCRIPTION

ELECTRICAL
POWER FLOOR
PLANS

E2.2



A. ALL EXIST FIXTURES/EMERGENCY BATTERY PACK LIGHT FIXTURE SHALL BE CONNECTED TO UNSWITCHED OR NON-DIMMING HOT LEG OF SAME VOLTAGE/PHASE OF LOCAL LIGHTING CIRCUIT IN SPACE.

A. ALL EXIST FIXTURES/EMERGENCY BATTERY PACK LIGHT FIXTURE SHALL BE CONNECTED TO UNSWITCHED OR NON-DIMMING HOT LEG OF SAME VOLTAGE/PHASE OF LOCAL LIGHTING CIRCUIT IN SPACE.

B. VERIFY CEILING TYPES AND COORDINATE WITH FIXTURE TYPE LIGHT FIXTURE SHALL BE COMPATIBLE WITH CEILING TYPE AS INDICATED ON THE ARCHITECTURAL DOCUMENTS. NOTIFY ENGINEER IF DISCREPANCIES EXIST PRIOR TO ORDERING FIXTURES.

C. COORDINATE EXACT ROUTING OF ALL CONDUIT ABOVE CEILING IN BUILDING, TYPICAL FOR ALL BUILDING EXTERIOR LIGHTING.

D. COORDINATE LOCATION OF LIGHTS WITH DIFFUSERS AND GRILLES.

E. SWITCH LEGS ARE NOT SHOWN WHERE SWITCHING SCHEMATIC IS OBVIOUS.

F. ALL EXIST FIXTURE TYPE "X1" & "X2" EMERGENCY LIGHT FIXTURE TYPE "E" AND ALL EMERGENCY BALLAST SHALL BE ON CIRCUIT "DPEL-38". FIXTURE TYPE LABEL WITH AN "E" ARE LIGHT FIXTURES WITH EMERGENCY BALLAST. REFER TO LIGHT FIXTURE SCHEDULE.

ELECTRICAL KEYNOTES	
1	EXISTING LIGHTING FIXTURE TO BE REPLACED BY FIXTURE AS SCHEDULED TO BE PART OF ALTERNATE BID. IF ALTERNATE IS ACCEPTED, REMOVE EXISTING LIGHTING AND TIE INTO EXISTING LIGHTING CIRCUIT.
2	EMERGENCY BATTERY CIRCUIT SHALL TIE INTO NEW PANEL AS INDICATED.

NEGRETTE & KOLAR
ARCHITECTS^{LLP}
WWW.NEKOARCH.COM



Project #1809

CITY OF McALLEN
DEPT OF PUBLIC WORKS
AUTO WAREHOUSE EXPANSION
McAllen, Texas

NO.	DATE	DESCRIPTION
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NO.	DATE	DESCRIPTION
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ELECTRICAL
LIGHTING
ALTERNATE #2

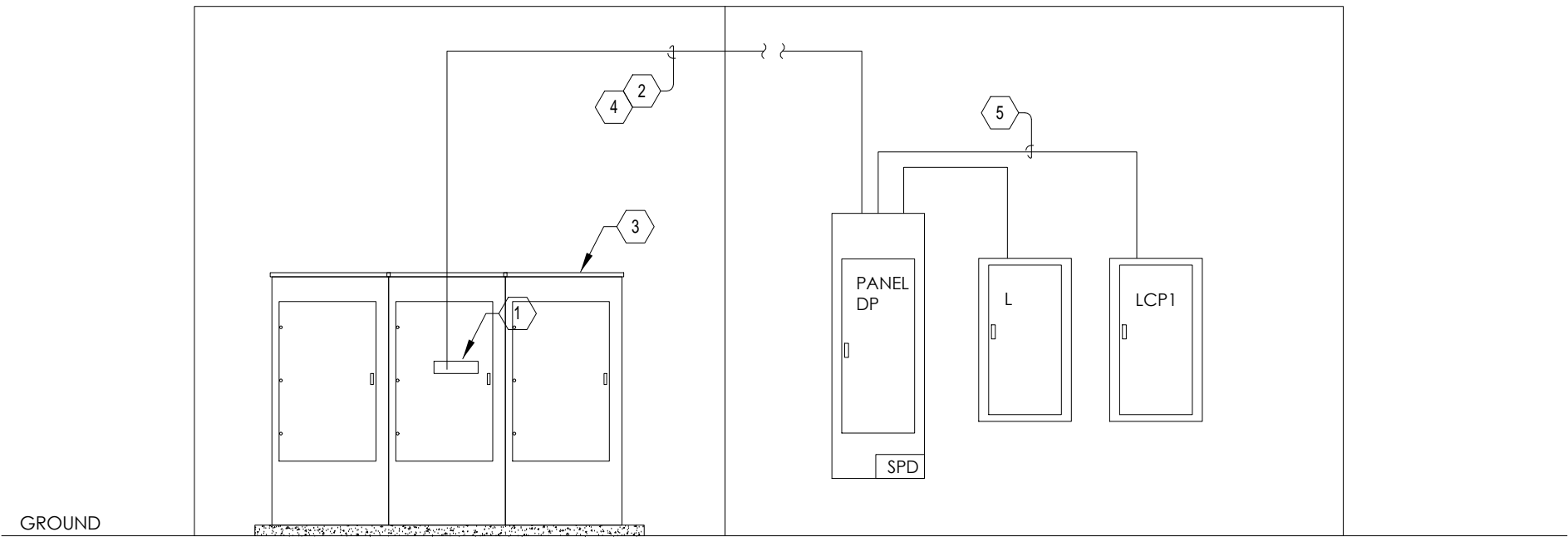
E2.3

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MEP ENGINEERING
3533 Moreland Dr. Ste A | Weslaco, Tx
78596 p:956.973.0500 | f:956-351-5750
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Project number:18.339

120/208, 3-PHASE, 4W ELECTRICAL LOAD ANALYSIS		
DESCRIPTION	TOTAL KVA	
LIGHTING	4.37	
GENERAL POWER	26.78	
EQUIPMENT	45.4	
HVAC	10.4	
TOTAL WATTS:		86.9
TOTAL AMPS:		241
TOTAL AMPS+25%:		301
WIRE SIZE AMPS:		400

GENERAL NOTES:

- A. PROVIDE GROUND /BONDING AS INDICATED ON THE NATIONAL ELECTRICAL CODE.
- B. NAME PLATES SHALL BE PROVIDED FOR ALL ELECTRICAL SWITCH GEAR, PANEL BOARDS, LIGHTING CONTACTORS, LIGHTING CONTROL PANELS, ETC., BY ELECTRICAL CONTRACTOR.
- C. NEW ELECTRICAL METERING AND SERVICE EQUIPMENT SHALL BE PROVIDED AND INSTALLED ACCORDING TO THE LOCAL POWER UTILITY CO. AND CITY REQUIREMENTS. VERIFY AND COORDINATE WITH POWER UTILITY CO. AND AHJ BEFORE BID AND INSTALLATION.
- D. COMPLY WITH NFPA 70E SAFETY REQUIREMENTS.
- E. PANELBOARDS WITH MORE THAN 42 CIRCUITS SHALL BE IN ONE CABINET ENCLOSURE, UNLESS OTHERWISE NOTED.
- F. PROVIDE 4"CONCRETE PAD FOR ALL DRY-TYPE TRANSFORMERS.
- G. ALL TWO SECTION PANELBOARDS SHALL BE FEED THRU LUGS.
- H. CONTRACTOR SHALL BE RESPONSIBLE FOR DELIVERY OF ELECTRICAL SERVICE TO THE NEW BUILDING WITHIN PROJECT SCHEDULE. COORDINATE ALL COST FOR LABOR AND MATERIALS WITH LOCAL ELECTRICAL UTILITY COMPANY PRIOR TO BID. ALL COST ASSOCIATED WITH THE DELIVERY OF ELECTRICAL SERVICE INCLUDING ALL MATERIALS SHALL BE INCLUDED IN BID. TRANSITION OF NEW ELECTRICAL SERVICE SHALL PROCEED IN WEEKENDS OR HOLIDAYS, INCLUDE ALL COST IN BID FOR OVERTIME FROM ELECTRIC UTILITY COMPANY. NO ADDITIONAL PAYMENT WILL BE MADE FOR SERVICE DELIVERY COSTS AFTER CONTRACT HAS BEEN AWARDED.
- I. THE CONTRACTOR SHALL FURNISH SHORT-CIRCUIT AND PROTECTION DEVICE COORDINATE STUDIES WHICH SHALL BE PREPARED BY THE EQUIPMENT GEAR MANUFACTURER.
- J. THE CONTRACTOR SHALL FURNISH AN ARC FLASH HAZARD ANALYSIS STUDY PER NFPA 70E- STANDARD FOR ELECTRICAL SAFETY IN THE WORKPLACE, REFERENCE ARTICLE 130.3 AND ANNEX D.
- K. CONTRACTOR SHALL INCLUDE ALL COST TO PROVIDE SHORT CIRCUIT AND PROTECTIVE DEVICE. THE SHORT-CURCUIT AND PROTECTIVE DEVICE COORDINATE STUDIES SHALL BE SUBMITTED TO THE DESIGN ENGINEER PRIOR TO RECEIVING FINAL APPROVAL OF THE DISTRIBUTION EQUIPMENT SHOP DRAWINGS AND/OR PRIOR TO RELEASE OF EQUIPMENT DRAWINGS FOR MANUFACTURING. APPROVAL FROM THE ENGINEER MAY BE OBTAINED FOR PRELIMINARLY SUBMITTAL OF SUFFICIENT STUDY DATA. TO ENSURE THAT THE SELECTION OF DEVICE AND CHARACTERISTICS WILL BE SATISFACTORY.



1 ELECTRICAL SCHEMATIC DIAGRAM
SCALE: NTS

Electrical Disconnect Schedule	
Mark	Description
FCCU-1	30AMP, 1-PHASE, 3W, N3R,208V, S/N, H.D. FUSED DISCONNECT
JH	30AMP, 3-PHASE, 4W, N1, 208V, S/N, H.D. FUSED DISCONNECT @ 20AMPS SHUNT TRIP ENCLOSED BREAKER, SHUNT TRIP INTERLOCK WITH FIRE ALARM SYSTEM
JH1	30AMP, 3-PHASE, 4W, N1, 208V, S/N, N.F., H.D. DISCONNECT SHUNT TRIP ENCLOSED BREAKER, SHUNT TRIP INTERLOCK WITH FIRE ALARM SYSTEM
JHL	30AMP, 1-PHASE, 3W, N1,120V, S/N, N.F., H.D. DISCONNECT
LIFT(TYP FOR ALL)	30AMP, 1-PHASE, 3W, N3R,208V, S/N, H.D. FUSED DISCONNECT
OVERHEAD DOOR	30AMP, 1-PHASE, 3W, N3R,208V, S/N, H.D. FUSED DISCONNECT
RH-1	30AMP, 1-PHASE, 3W, N1, 120V, S/N, N.F., H.D. DISCONNECT
RH-2	30AMP, 1-PHASE, 3W, N1, 120V, S/N, N.F., H.D. DISCONNECT
RH-3	30AMP, 1-PHASE, 3W, N1, 120V, S/N, N.F., H.D. DISCONNECT
RH-4	30AMP, 1-PHASE, 3W, N1, 120V, S/N, N.F., H.D. DISCONNECT

GENERAL NOTES:

1.) REFER TO BREAKER SIZE FOR FUSE SIZE.

2.) REFER TO PANELBOARD FOR DISCONNECT PHASES AND VOLTAGE.

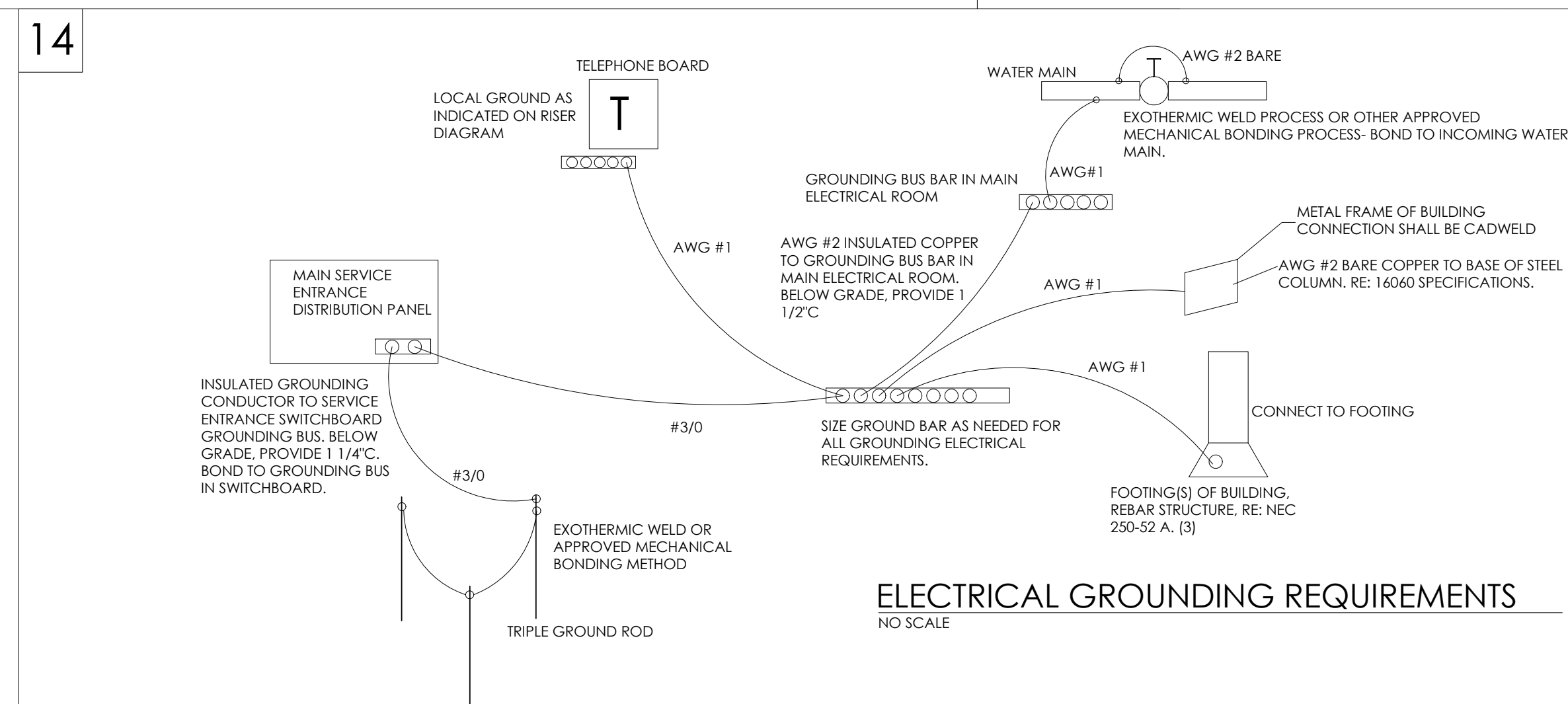
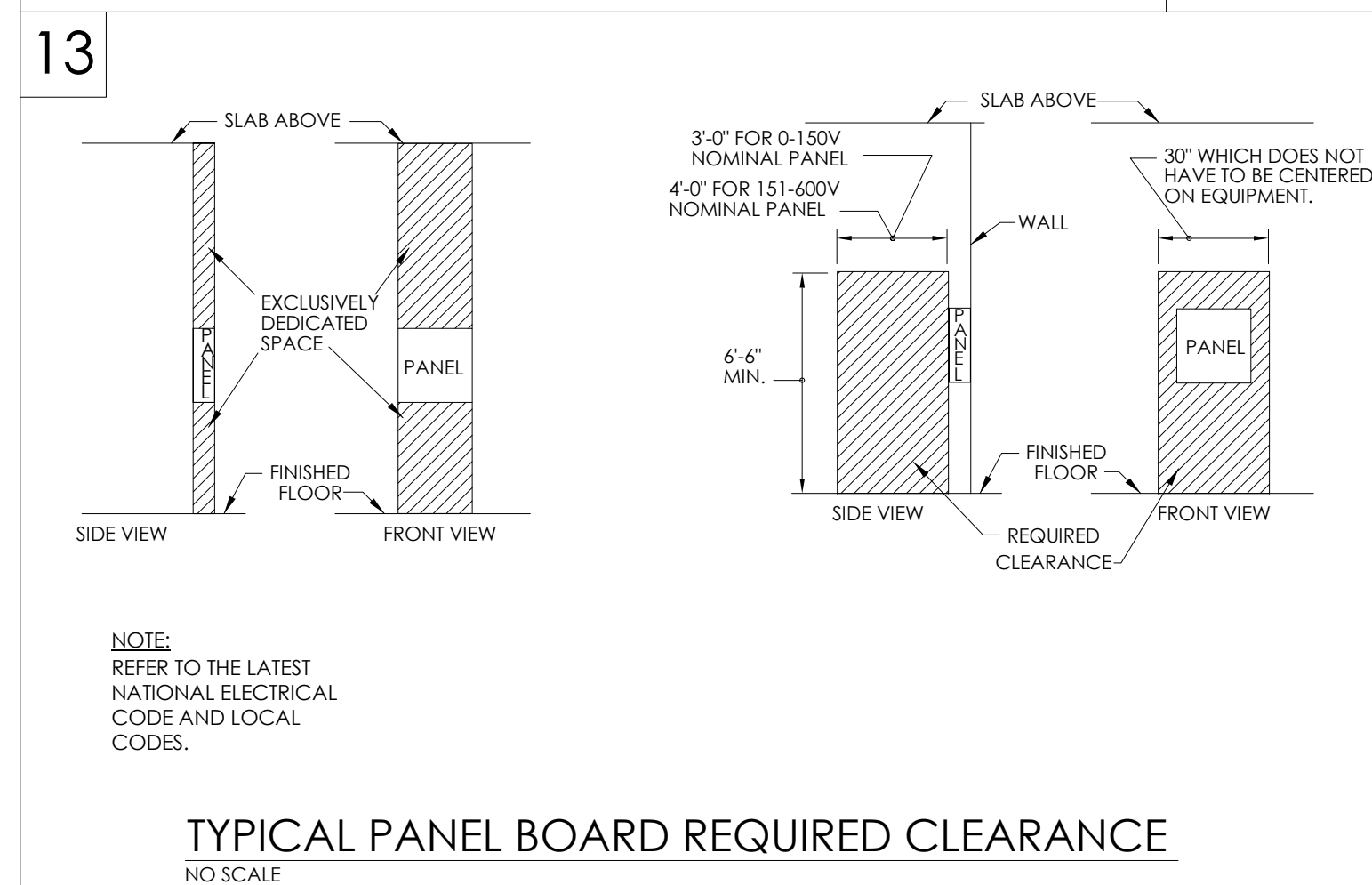
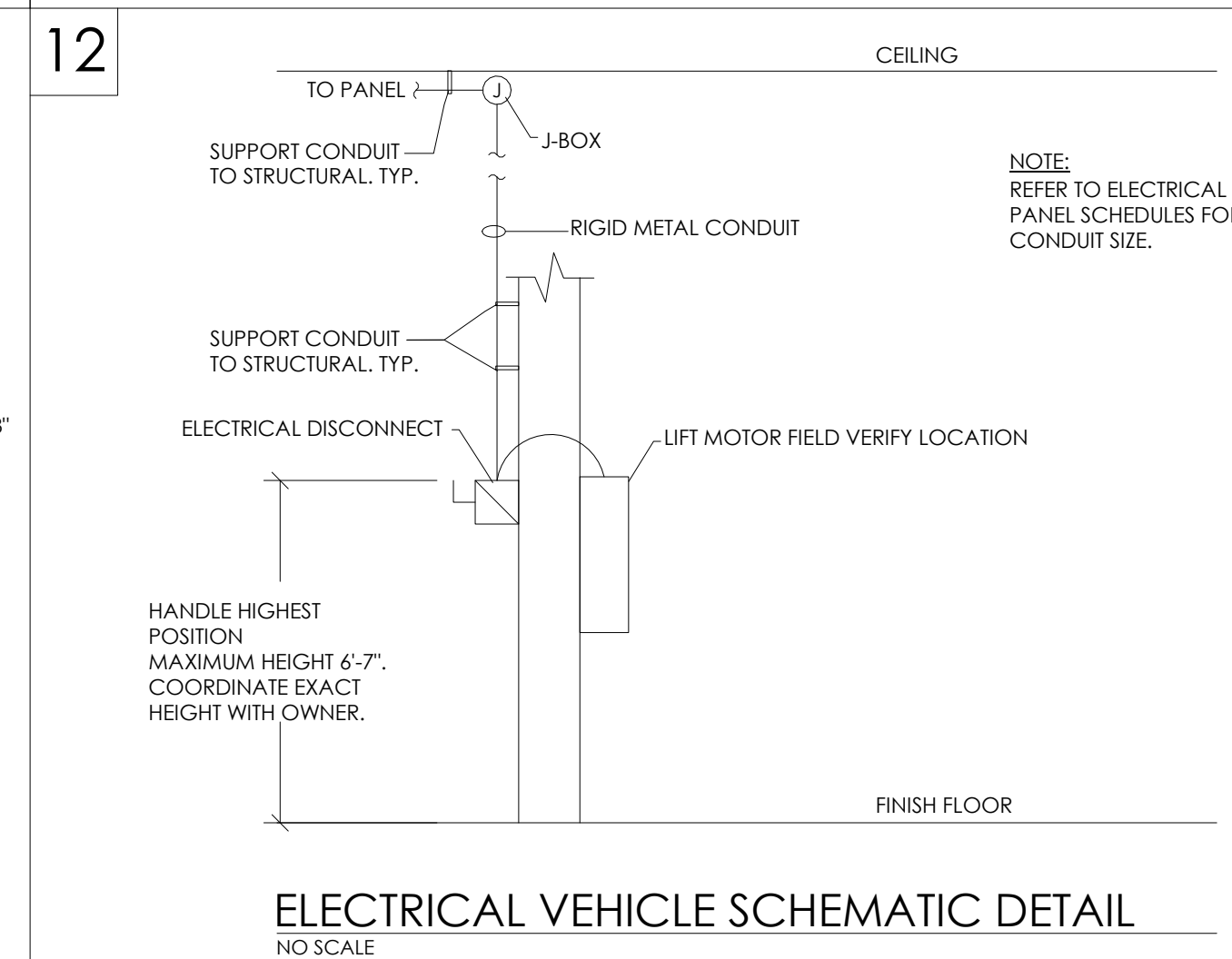
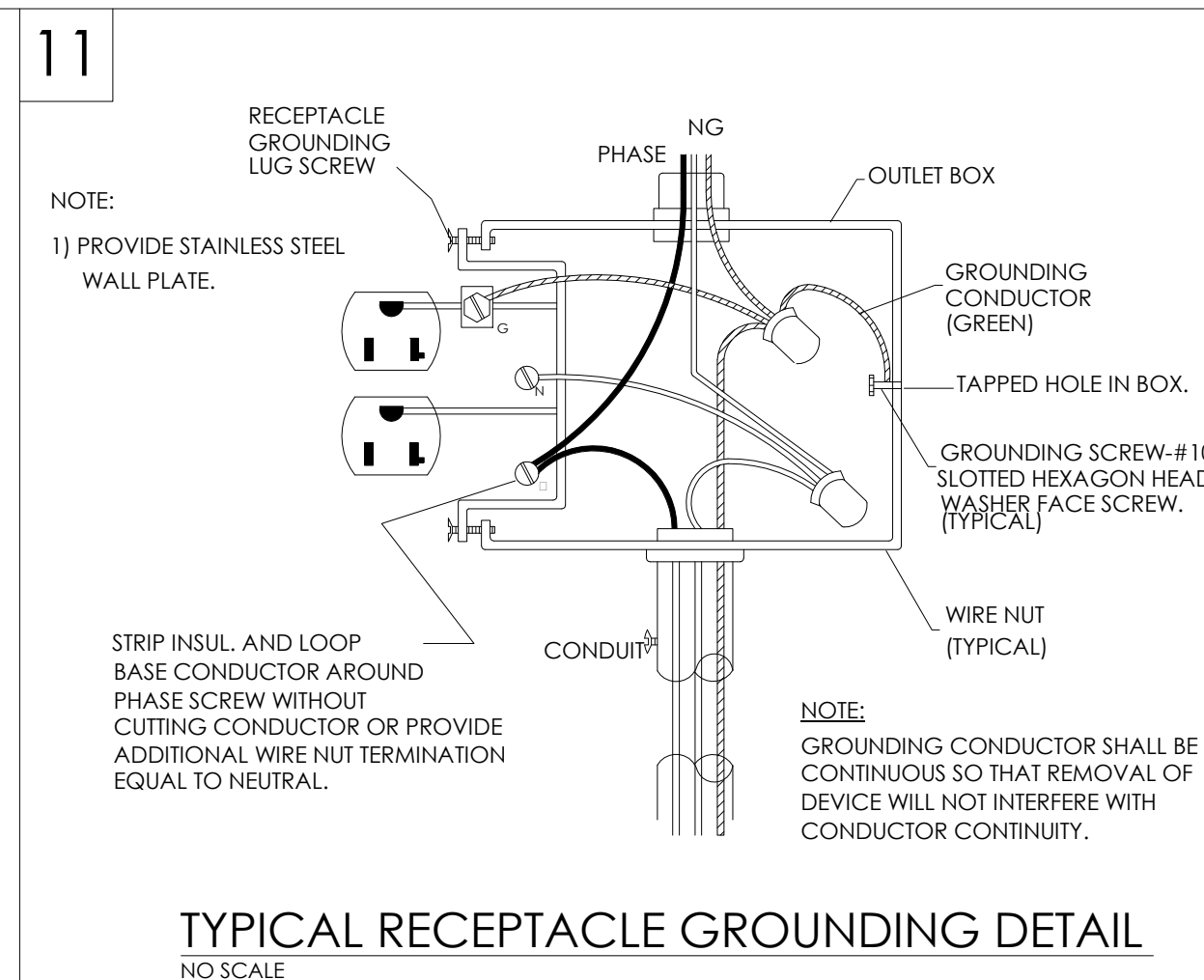
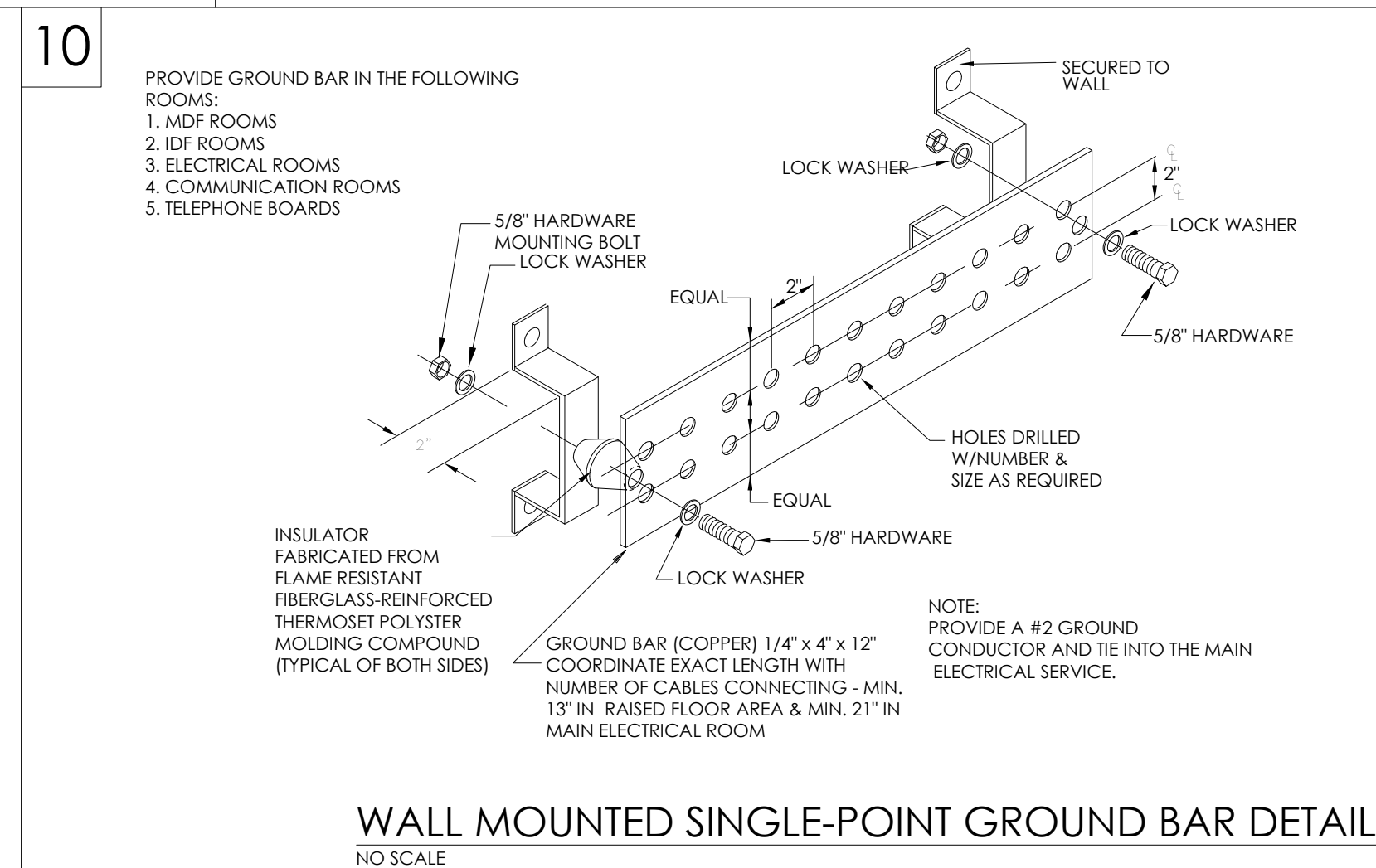
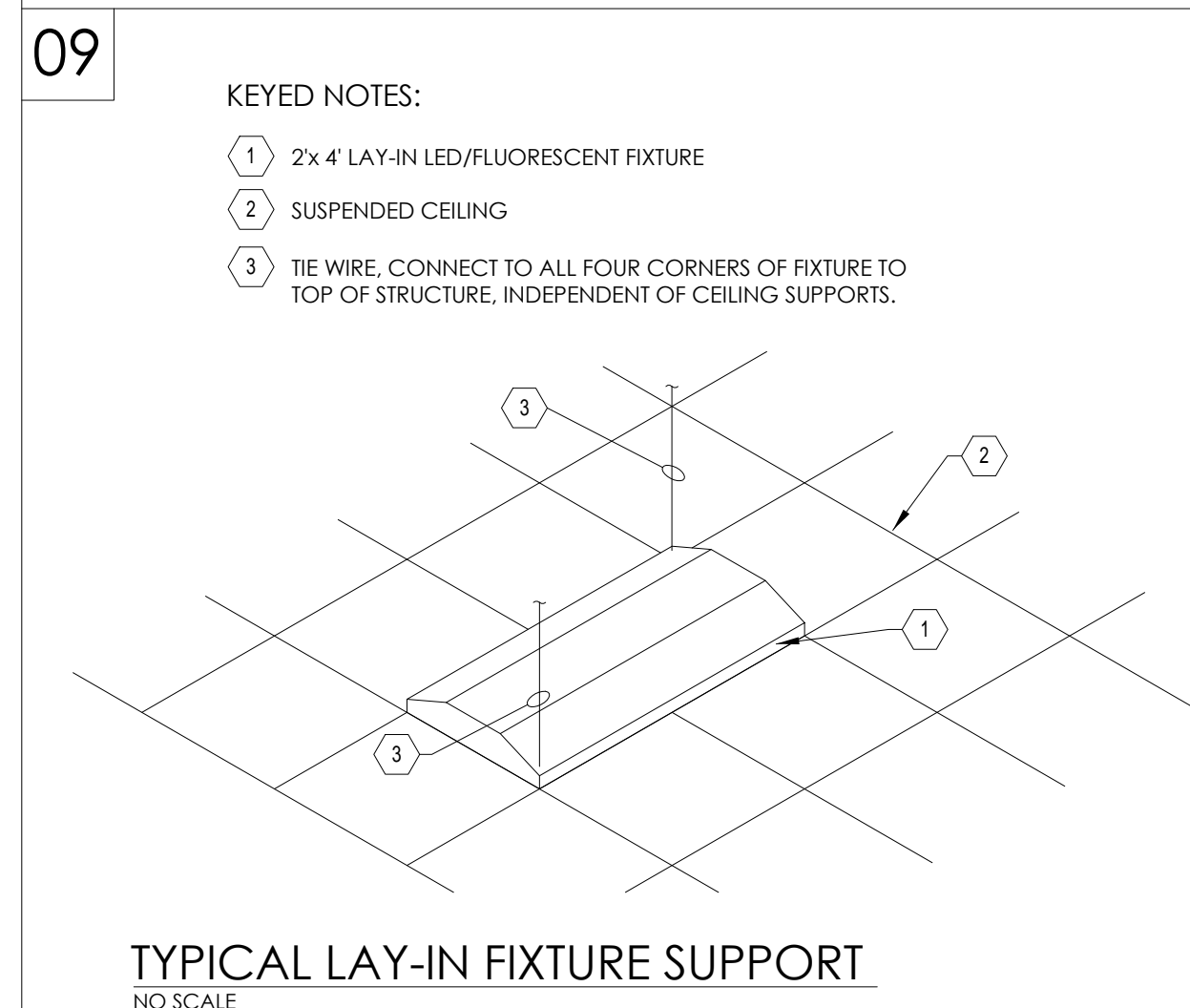
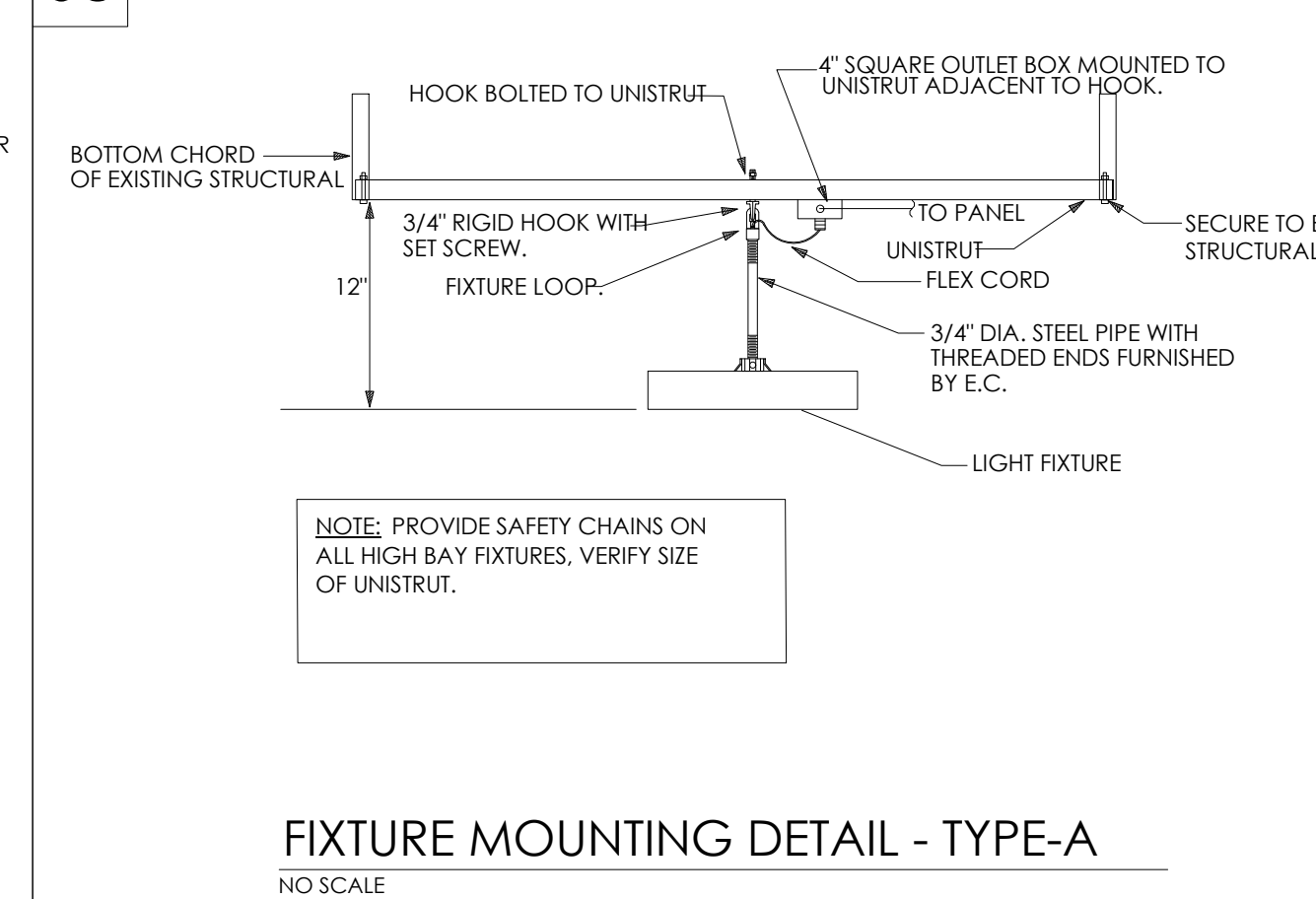
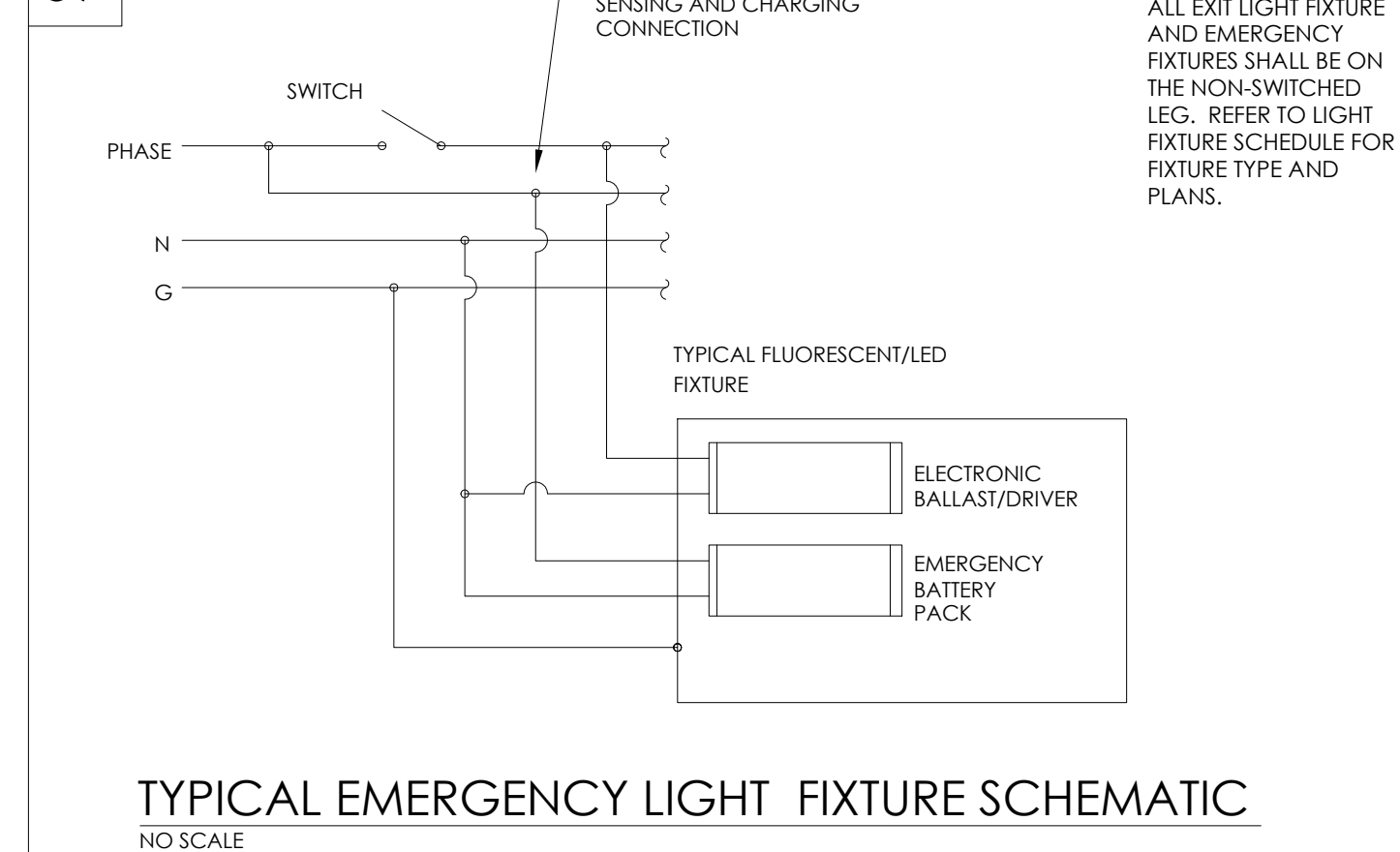
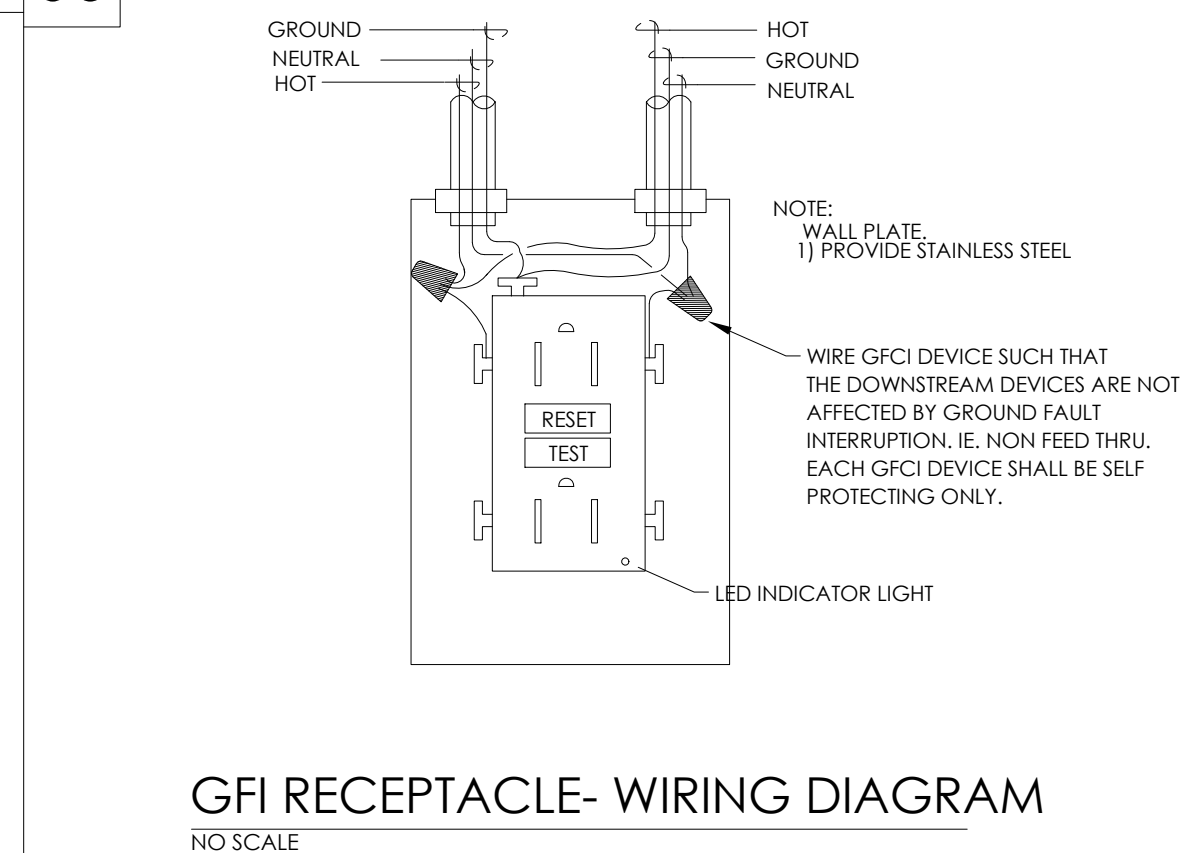
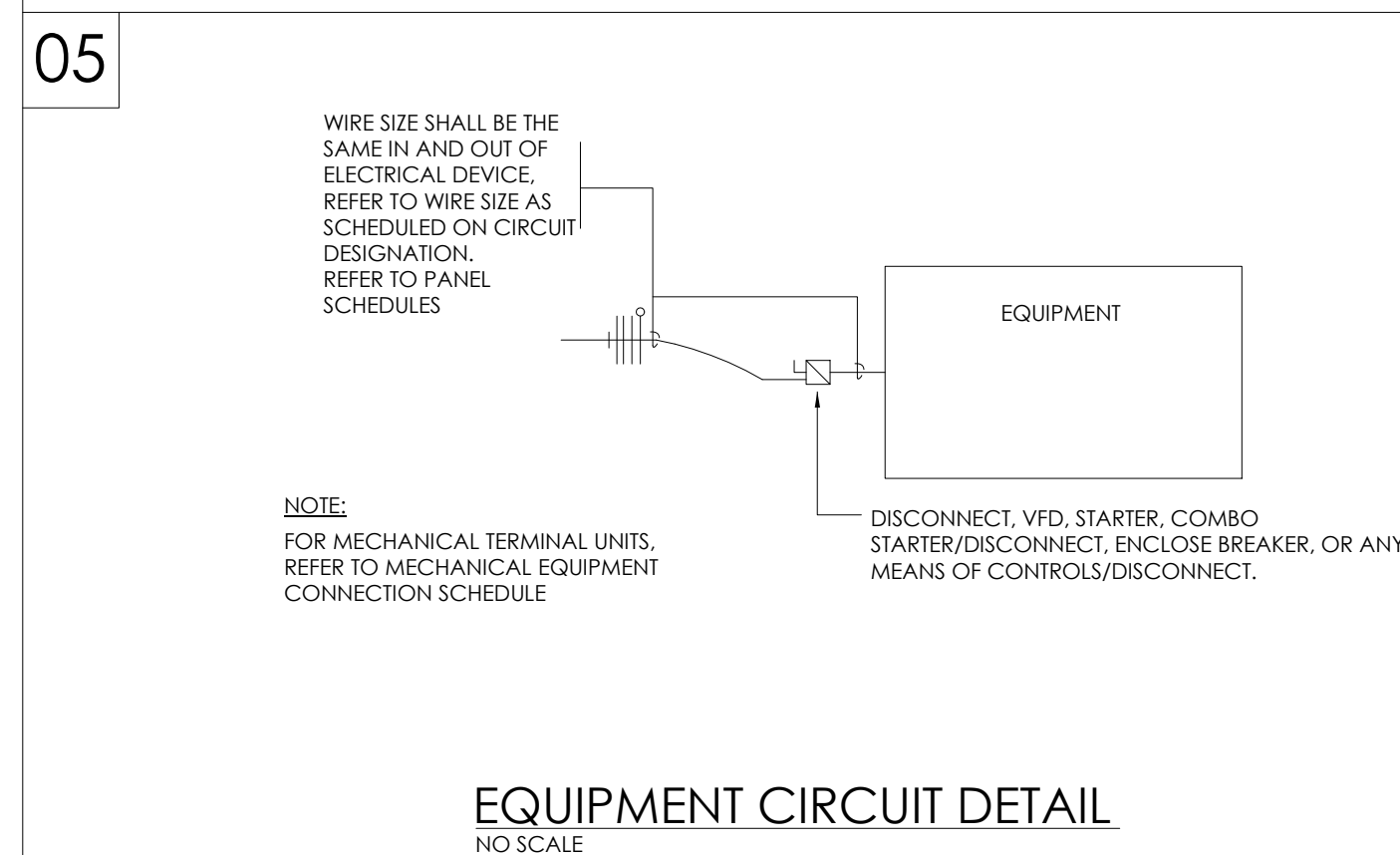
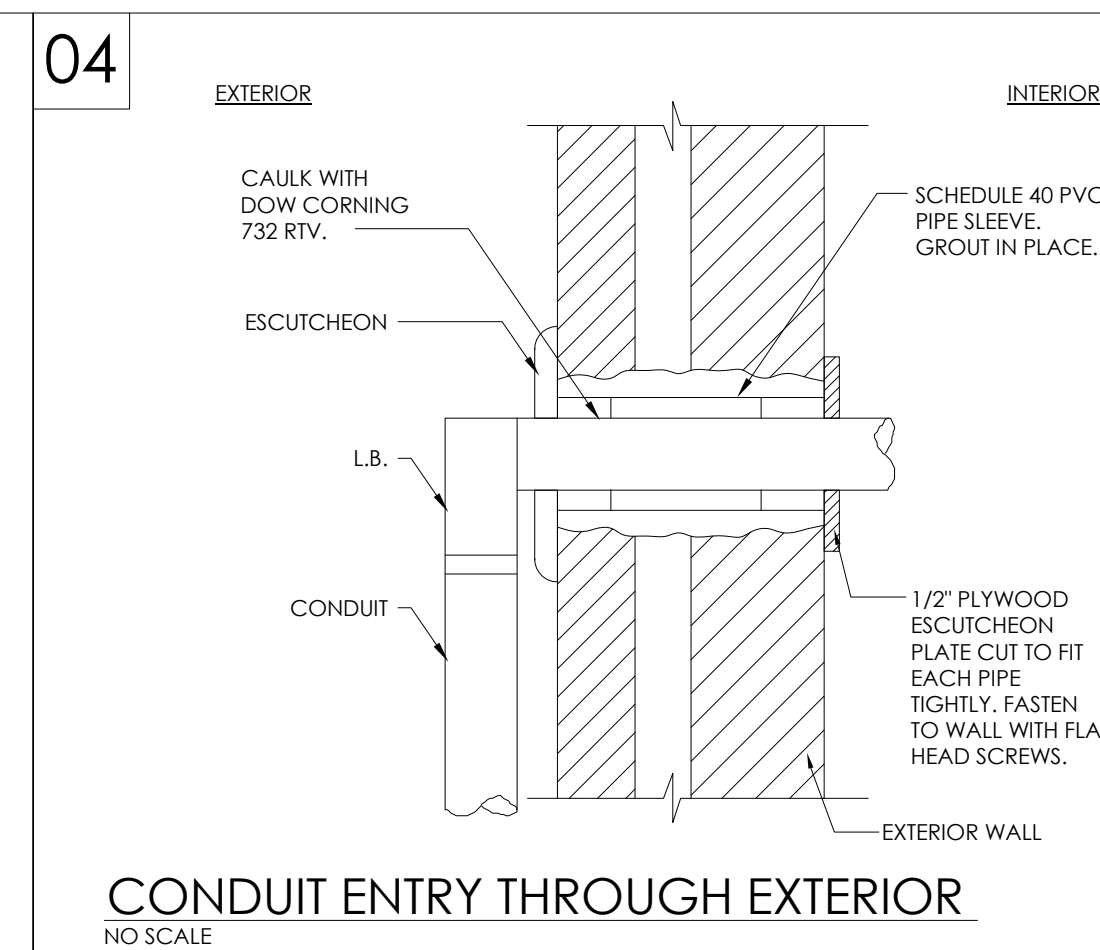
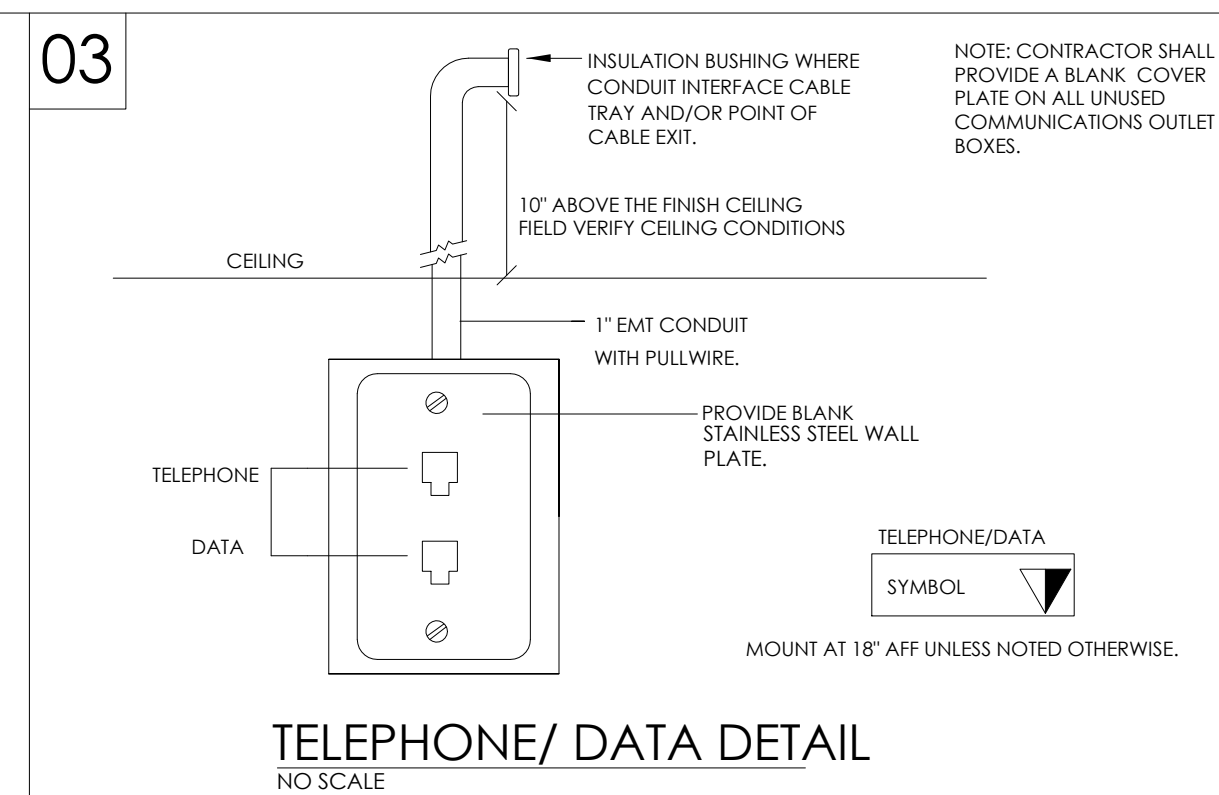
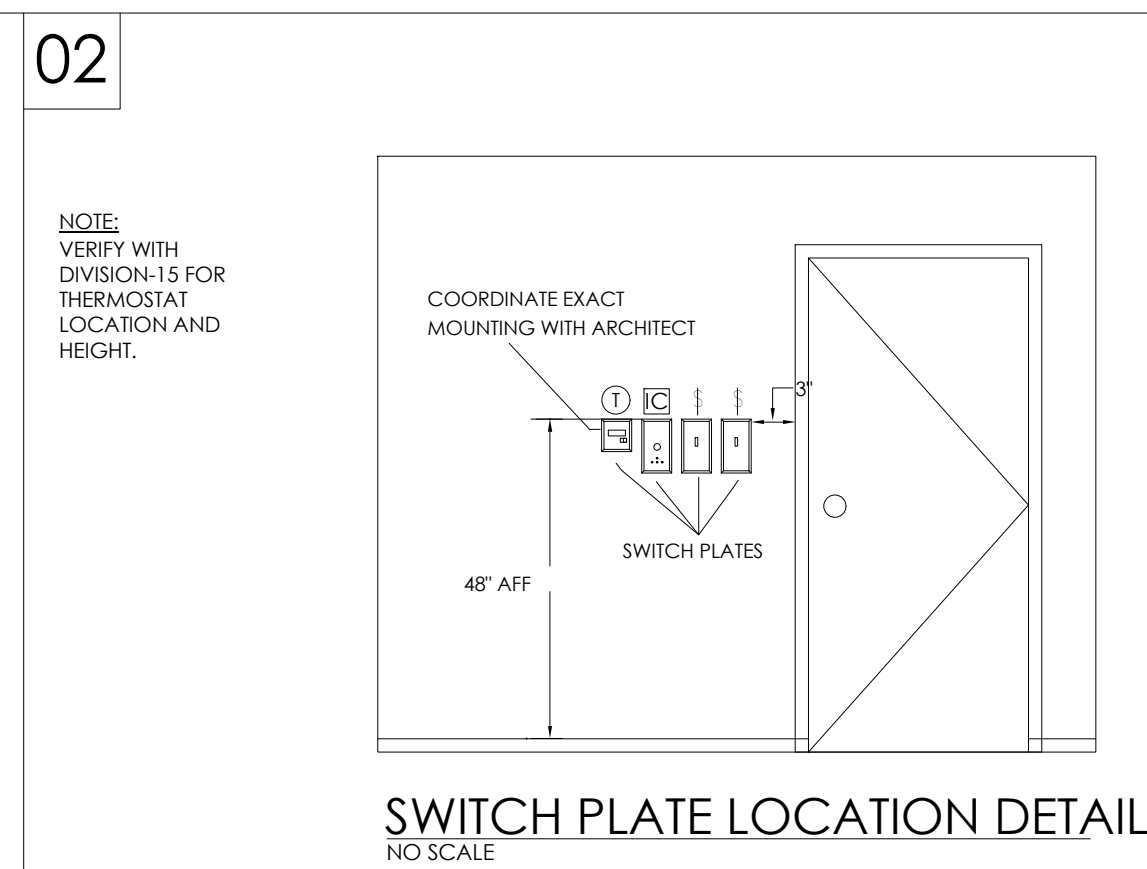
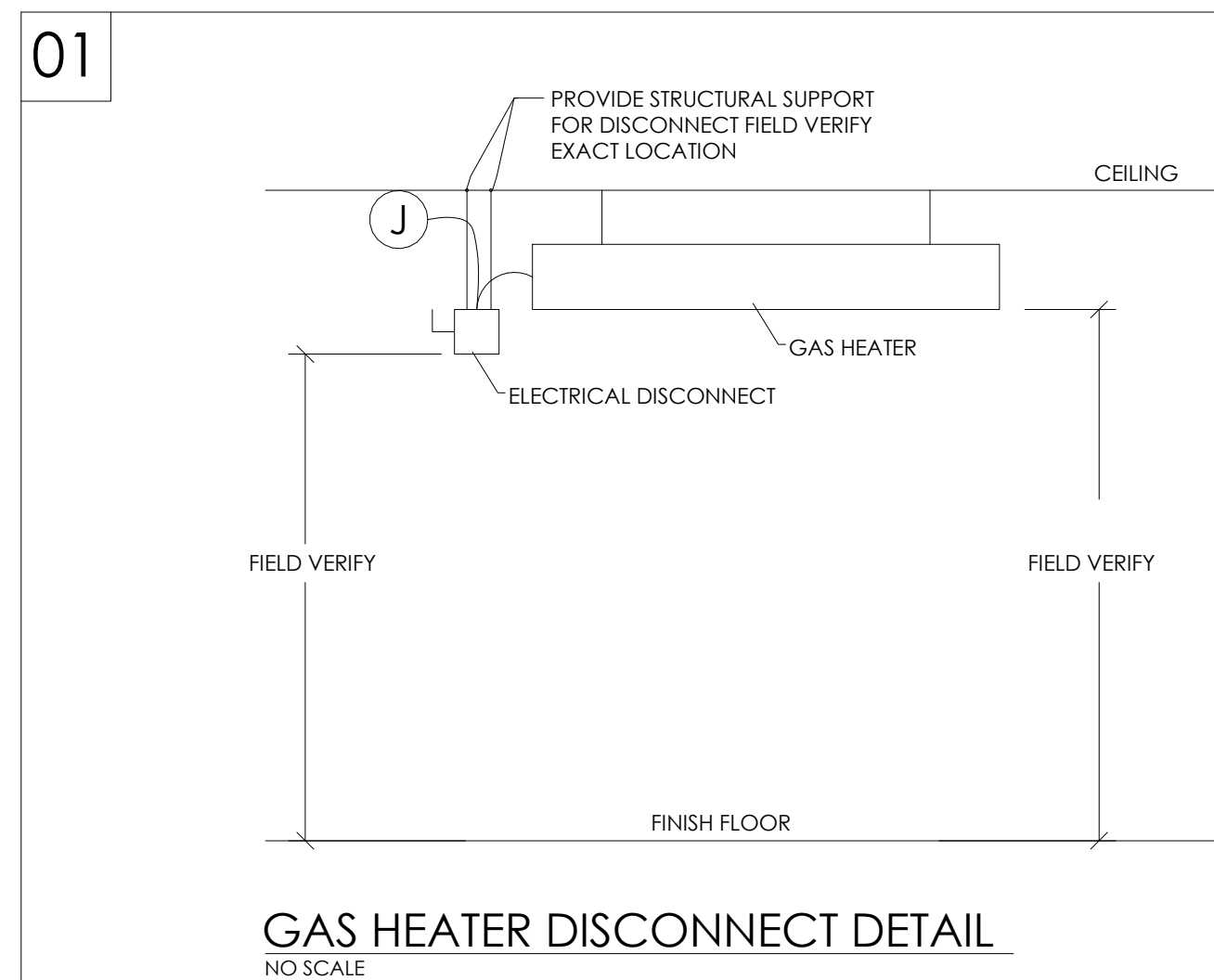
3.) JH AND JH1 MUST INCLUDE AUX DISCONNECT CONTACT RATED FOR USE WITH 24VDC AT UP-TO 2A. NOTE THAT FOR INSTALLATIONS REQUIRING A SHUNT TRIP FEATURE TO SUPPORT ACTIVATION OF HOISTWAY SPRINKLERS, THE SHUNT TRIP MECHANISM MAY BE INSTALLED WITHIN JH, OR ON THE SHUNT TRIP MECHANISM PRECEDING THE JH DISCONNECT.

ELECTRICAL RISER
DIAGRAM KEYED NOTES:

- 1 PROVIDE NEW 400AMP, 208V, 3-PHASE BREAKER IN EXISTING SWITCHBOARD. FIELD VERIFY EXISTING CONDITIONS PRIOR TO COMMENCING ANYWORK. INCLUDE BREAKER FRAME COORDINATE WITH SWITCHBOARD MANUFACTURE AND MODEL.
- 2 COORDINATE ALL ROUTING OF NEW CONDUIT MUST BE CONCEALED IF CEILING PRESENT, WHERE EXPOSED TOP DECK CONDUIT MUST BE SECURED TO STRUCTURE AND PAINTED TO MATCH EXISTING/NEW FINISH COLOR. FIELD VERIFY POSSIBLE OBSTRUCTIONS PRIOR TO ROUGH-IN.
- 3 EXISTING SQ.D ELECTRICAL SWITCHBOARD, 1600A, 120/208V, 3-PHASE, 4W, NEMA-3R, 3-SECTION, PROVIDE NEW 400AMP, 3-POLE BREAKER IN SPACE AVAILABLE. INCLUDE NEW BREAKER MOUNTING HARDWARE.
- 4 PROVIDE 4#600KCML, 1#3G, 4" C.
- 5 LIGHTING AND FAN CIRCUITS, REFER TO RELAY PANEL SCHEDULE.

Branch Panel: DP														
Location: AUTO WAREHOUSE 101					Volts: 120/208 Wye				A.I.C. Rating: 35					
Supply From:					Phases: 3				Mains Type: MB					
Mounting: Surface					Wires: 4				Mains Rating: 400 A					
Enclosure: Type 1									MCB Rating: 400 A					
CKT	Circuit Description	Trip	Poles	Wire Size	A		B	C	Wire Size	Poles	Trip	Circuit Description	CKT	
DP-1	PANEL-L	200 A	3	4#30, 1#6G, 2" C	19440 VA	750 VA			3#10, 1#10G, 3/4" C	2	20 A	EF-5	DP-2	
DP-3	--	--	--	--			22072 VA	750 VA	--	--	--	--	DP-4	
DP-5	--	--	--	--				21520 VA	750 VA	3#12, 1#12G, 1/2" C	2	20 A	EF-4	DP-6
DP-7	EF-3	20 A	2	3#12, 1#12G, 1/2" C	750 VA	750 VA			--	--	--	--	DP-8	
DP-9	--	--	--	--			750 VA	750 VA	3#12, 1#12G, 1/2" C	2	20 A	EF-2	DP-10	
DP-11	EF-1	20 A	2	3#12, 1#12G, 1/2" C				750 VA	750 VA	--	--	--	DP-12	
DP-13	--	--	--	--	750 VA	800 VA			2#10, 1#10G, 3/4" C	1	20 A	RH-1,2,3,4	DP-14	
DP-15	2.) ELEVATOR(JH&JH1)	30 A	3	4#2, 1#6G, 1.5" C			3600 VA	0 VA	--	--	--	Space	DP-16	
DP-17	--	--	--	--				3600 VA	0 VA	--	--	Space	DP-18	
DP-19	--	--	--	--		3600 VA	0 VA		--	--	--	Space	DP-20	
DP-21	ELEVATOR(JHL)	30 A	1	2#3, 1#6G, 1.5" C		2400 VA	1320 VA		2#6, 1#10G, 1" C	1	20 A	Lighting	DP-22	
DP-23	Lighting	20 A	1	2#4, 1#6G, 1.5" C				1292 VA	801 VA	2#6, 1#10G, 1" C	1	20 A	Lighting	DP-24
DP-25	Lighting	20 A	1	2#12, 1#12G, 1/2" C	0 VA	0 VA			--	--	--	Space	DP-26	
DP-27	Space	--	--	--			0 VA	0 VA	--	--	--	Space	DP-28	
DP-29	Space	--	--	--				0 VA	0 VA	--	--	Space	DP-30	
DP-31	Space	--	--	--	0 VA	0 VA			--	--	--	Space	DP-32	
DP-33	Space	--	--	--			0 VA	0 VA	--	--	--	Space	DP-34	
DP-35	Space	--	--	--				0 VA	0 VA	--	--	Space	DP-36	
DP-37	1.) SPD	30 A	3		0 VA	0 VA			--	--	--	Space	DP-38	
DP-39	--	--	--	--					0 VA	0 VA	1	20 A	Space	DP-40
DP-41	--	--	--	--							1	20 A	Space	DP-42
Total Load:					28940 VA	31642 VA	29418 VA							
Total Amps:					224 A	267 A	248 A							
Load Classification					Connected Load	Demand Factor	Estimated Demand		Panel Totals					
HVAC					10400 VA	100.00%	10400 VA							
Motor					32000 VA	125.00%	40000 VA		Total Conn. Load: 87888 VA					
Other					1200 VA	100.00%	1200 VA		Total Est. Demand: 88350 VA					
Receptacle					26780 VA	68.67%	18390 VA		Total Conn.: 244 A					
Power					13200 VA	100.00%	13200 VA		Total Est. Demand: 245 A					
Lighting					3377 VA	125.00%	4221 VA							
EMERGENCY LIGHTING					1000 VA	100.00%	1000 VA							
Notes:														
1) PROVIDE SURGE PROTECTION DEVICE, 160KA WITH SEPARATE DISCONNECT MEANS.														
2) PROVIDE SHUNT TRIP BREAKER, INTERLOCK WITH FIRE ALARM SYSTEM.														

Branch Panel: PANEL-L													
Location: AUTO WAREHOUSE 101						Volts: 120/208 Wye			A.I.C. Rating: 18				
Supply From: DP						Phases: 3			Mains Type:				
Mounting: Surface						Wires: 4			Mains Rating: 225 A				
Enclosure: Type 1									MCB Rating: 225 A				
CKT	Circuit Description	Trip	Poles	Wire Size	A	B	C	Wire Size	Poles	Trip	Circuit Description	CKT	
L-1	Receptacle	20 A	1	2#12, 1#12G, 1/2" C	360 VA	360 VA		2#12, 1#12G, 1/2" C	1	20 A	Receptacle	L-2	
L-3	Receptacle	20 A	1	2#12, 1#12G, 1/2" C		360 VA	360 VA	2#12, 1#12G, 1/2" C	1	20 A	Receptacle	L-4	
L-5	Receptacle	20 A	1	2#12, 1#12G, 1/2" C			360 VA	2#12, 1#12G, 1/2" C	1	20 A	Receptacle	L-6	
L-7	Receptacle	20 A	1	2#12, 1#12G, 1/2" C	360 VA	800 VA		2#8, 1#10G, 3/4" C	1	20 A	Receptacle	L-8	
L-9	Receptacle	20 A	1	2#12, 1#12G, 1/2" C		1500 VA	1250 VA	3#10, 1#10G, 3/4" C	2	30 A	OVERHEAD DOOR	L-10	
L-11	OVERHEAD DOOR	30 A	2	3#10, 1#10G, 3/4" C			1250 VA	1250 VA	--	--	--	L-12	
L-13	--	--	--	--	1250 VA	1250 VA		3#10, 1#10G, 3/4" C	2	30 A	OVERHEAD DOOR	L-14	
L-15	OVERHEAD DOOR	30 A	2	3#10, 1#10G, 3/4" C		1250 VA	1250 VA	--	--	--	--	L-16	
L-17	--	--	--	--			1250 VA	3#10, 1#10G, 3/4" C	2	30 A	OVERHEAD DOOR	L-18	
L-19	OVERHEAD DOOR	30 A	2	3#10, 1#10G, 3/4" C	1250 VA	1250 VA		--	--	--	--	L-20	
L-21	--	--	--	--		1250 VA	1250 VA	3#10, 1#10G, 3/4" C	2	30 A	OVERHEAD DOOR	L-22	
L-23	OVERHEAD DOOR	30 A	2	3#10, 1#10G, 3/4" C	1250 VA	360 VA		1250 VA	1250 VA	--	--	L-24	
L-25	--	--	--	--			1250 VA	2#12, 1#12G, 1/2" C	1	20 A	Receptacle	L-26	
L-27	LIFT	30 A	2	3#10, 1#10G, 3/4" C		750 VA	750 VA	3#10, 1#10G, 3/4" C	2	30 A	LIFT	L-28	
L-29	--	--	--	--			750 VA	750 VA	--	--	--	L-30	
L-31	LIFT	30 A	2	3#10, 1#10G, 3/4" C	750 VA	750 VA		3#10, 1#10G, 3/4" C	2	30 A	LIFT	L-32	
L-33	--	--	--	--		750 VA	750 VA	--	--	--	--	L-34	
L-35	LIFT	30 A	2	3#10, 1#10G, 3/4" C			750 VA	3#10, 1#10G, 3/4" C	2	30 A	LIFT	L-36	
L-37	--	--	--	--	750 VA	750 VA		--	--	--	--	L-38	
L-39	LIFT	30 A	2	3#10, 1#10G, 3/4" C		750 VA	750 VA	3#10, 1#10G, 3/4" C	2	30 A	LIFT	L-40	
L-41	--	--	--	--			750 VA	750 VA	--	--	--	L-42	
L-43	Receptacle	20 A	1	2#3, 186G, 1.5" C	1500 VA	1050 VA		3#10, 1#10G, 3/4" C	2	20 A	FCCL-1/FC-1	L-44	
L-45	Other	20 A	1	2#12, 1#12G, 1/2" C		200 VA	1050 VA	--	--	--	--	L-46	
L-47	Receptacle	20 A	1	2#8, 1#10G, 3/4" C			1500 VA	1000 VA	1	20 A	Other	L-48	
L-49	Space	--	--	--	0 VA	0 VA		--	--	--	Space	L-50	
L-51	EMERGENCY LIGHTING	20 A	1	2#12, 1#12G, 1/2" C		1000 VA	1500 VA	2#10, 1#10G, 3/4" C	1	20 A	Receptacle	L-52	
L-53	Lighting	20 A	1	2#12, 1#12G, 1/2" C			0 VA	1500 VA	2#12, 1#12G, 1/2" C	1	20 A	Receptacle	L-54
L-55	Receptacle	20 A	1	2#12, 1#12G, 1/2" C	1500 VA	1500 VA		2#10, 1#10G, 3/4" C	1	20 A	Receptacle	L-56	
L-57	Receptacle	20 A	1	2#8, 1#10G, 3/4" C		1500 VA	1500 VA	2#8, 1#10G, 3/4" C	1	20 A	Receptacle	L-58	
L-59	Receptacle	20 A	1	2#12, 1#12G, 1/2" C			1200 VA	2#10, 1#10G, 3/4" C	1	20 A	Receptacle	L-60	
L-61	Receptacle	20 A	1	2#10, 1#10G, 3/4" C	1200 VA	1200 VA		2#10, 1#10G, 3/4" C	1	20 A	Receptacle	L-62	
L-63	Receptacle	20 A	1	2#10, 1#10G, 3/4" C		1200 VA	1200 VA	2#10, 1#10G, 3/4" C	1	20 A	Receptacle	L-64	
L-65	Receptacle	20 A	1	2#12, 1#12G, 1/2" C			1200 VA	2#12, 1#12G, 1/2" C	1	20 A	Receptacle	L-66	
L-67	Space	--	--	--	0 VA	0 VA		--	--	--	Space	L-68	
L-69	Space	--	--	--		0 VA	0 VA	--	--	--	Space	L-70	
L-71	Space	--	--	--			0 VA	0 VA	1	20 A	Space	L-72	
L-73	Space	--	--	--	0 VA	0 VA		--	--	--	Space	L-74	
L-75	Space	--	--	--		0 VA	0 VA	--	--	--	Space	L-76	
L-77	Space	--	--	--			0 VA	0 VA	1	20 A	Space	L-78	
L-79	Spare	20 A	1		0 VA	0 VA		--	--	--	Space	L-80	
L-81	Spare	20 A	1			0 VA	0 VA	--	--	--	Space	L-82	
L-83	Spare	20 A	1				0 VA	0 VA	1	20 A	Space	L-84	
Total Load:					19440 VA	22072 VA	21520 VA						
Total...					162 A	187 A	182 A						
Load Classification		Connected Load		Demand Factor		Estimated Demand		Panel Totals					
WMC		2100 VA		100.00%		2100 VA		2100 VA					
Motor		32000 VA		125.00%		40000 VA		Total Conn. Load: 63031 VA					
Other		1200 VA		100.00%		1200 VA		Total Est. Demand: 62641 VA					
Receptacle		26780 VA		68.67%		18390 VA		Total Conn. Load: 175 A					
Lighting		0 VA		0.00%		0 VA		Total Est. Demand: 174 A					
EMERGENCY LIGHTING		1000 VA		100.00%		1000 VA							
Notes:													



11720 NORTH IH35
AUSTIN TEXAS 78753
PH. 512.474.6526
FAX. 512.474.6761

204 E. STUBBS
STREET
EDINBURG, TX
78539
PH. 956.386.0611
FAX. 956.386.0613

NEGRETE & KOLAR
ARCHITECTS^{LLP}
WWW.NECKARCH.COM



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ELECTRICAL DETAILS

E4.1

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01

RELAY LIGHTING CONTROL PANEL

Master CABINET CIRCUIT SCHEDULE

120/208VAC, 3 PHASE

PANEL LOCATION:

PANEL DESCRIPTION: NETWORKING 16 Relay Cabinet:

CATALOG NUMBER: XXX

PANEL ID: Master

PANEL FEED: DP

MOUNTING: Surface

RELAY	A	PNL CIRCUIT	LOAD		
NO.	TYPE		VAC	LOAD W/VA	CIRCUIT DESCRIPTION
1	2	20	DP-2,4	208V	1200 EF-5
3				1200	"
5	2	20	DP-6,8	208V	1200 EF-4
7				1200	"
9	2	20	DP-10,12	208V	1200 EF-2
11				1200	"
13	1	20	DP-24	120V	1200 EXTERIOR Lights
15	1	20			SPARE

LEGEND:

1 = RELAY-1-POLE,20A, UP TO 277VAC

2 = RELAY-2-POLE, 2-POLE, 20A, UP TO 480VAC

A=AMPS

3 = FAN RELAY 1-POLE, 20AMP, 120V

NOTES:

1. INCLUDE EXTERIOR PHOTO CELLS/SOFTWARE PROGRAMMING, COMMUNICATION CARD AND GRAPHICAL CONTROLS.

2. VERIFY WITH OWNER FOR ALL PROGRAMMING SEQUENCE.

3. REFER TO SPECIFICATION 1.6515.

4. PROVIDE DEDICATED 20AMP 120V FROM NEAREST 120/208V PANEL.

5. INCLUDE ALL TRAINING FOR PROGRAMMING AND STARTUP IN CONTRACT. REFER TO SPECIFICATIONS.

6. INCLUDE REMOTE CONTROL OPTION. OWNER TO PROVIDE DATA INPUT.

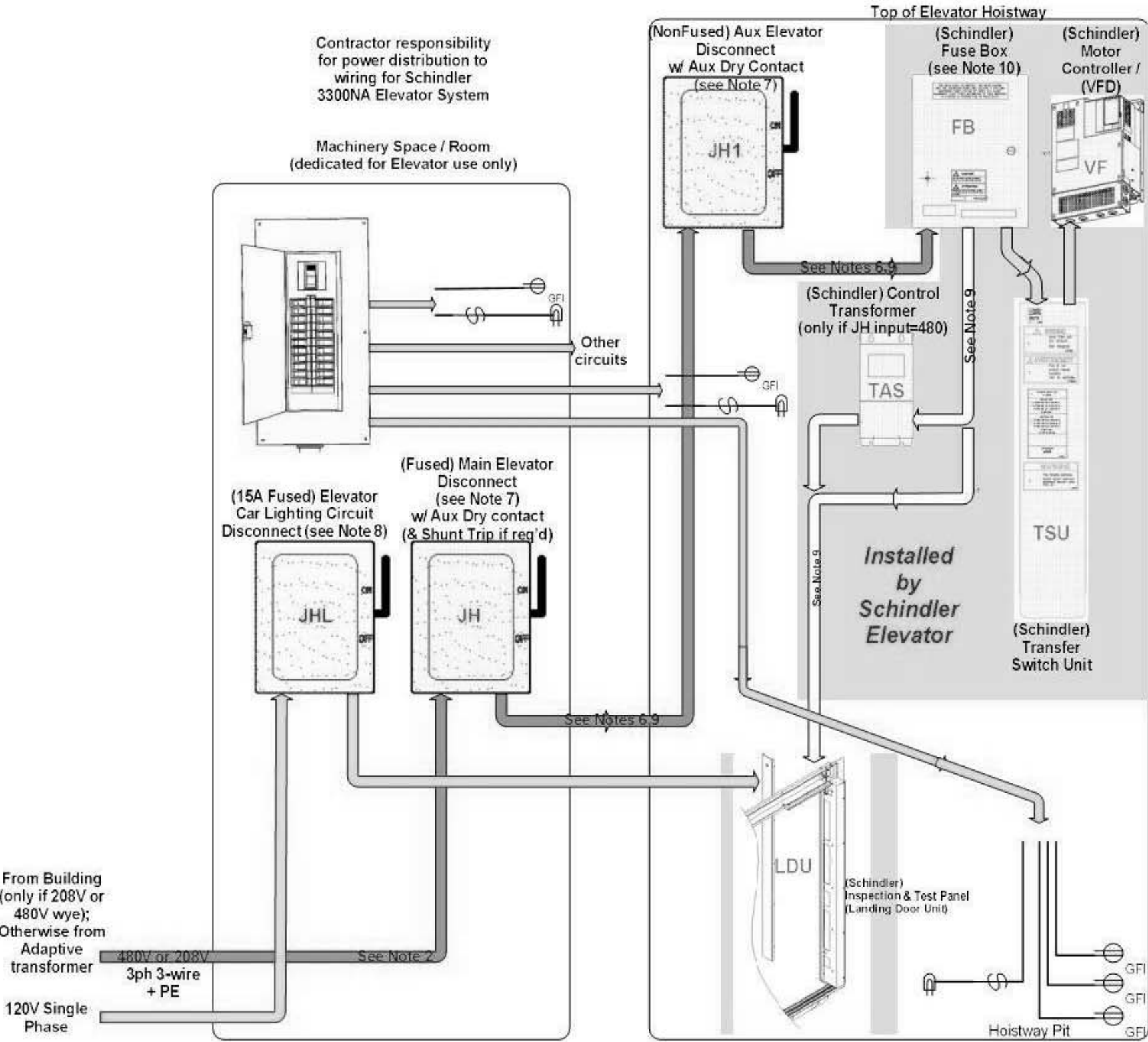
7. INCLUDE ASTRONOMICAL TIME CLOCK.

RELAY	A	PNL CIRCUIT	LOAD		
NO.	TYPE		VAC	LOAD W/VA	CIRCUIT DESCRIPTION
2	2	20	DP-7,9	208V	1200 EF-3
4				1200	"
6	2	20	DP-11,13	208V	1200 EF-1
8				1200	"
10	1	20	DP-22	120V	1200 INTERIOR Lights
12	1	20	DP-23	120V	1200 INTERIOR Lights
14	1	20			SPARE
16	1	20			SPARE

LIGHTING RELAY CONTROL PANELS

NO SCALE

02



ELEVATOR EQUIPMENT DETAIL

NO SCALE

11700 NORTH IH35
AUSTIN, TEXAS 78753
PH: 512.474.6526
FAX: 512.474.6761
204 E. STUBBS
STREET
EDINBURG, TX
PH: 281.956.3864
FAX: 281.956.3864

NEGRETE & KOLAR
ARCHITECTS^{LLP}
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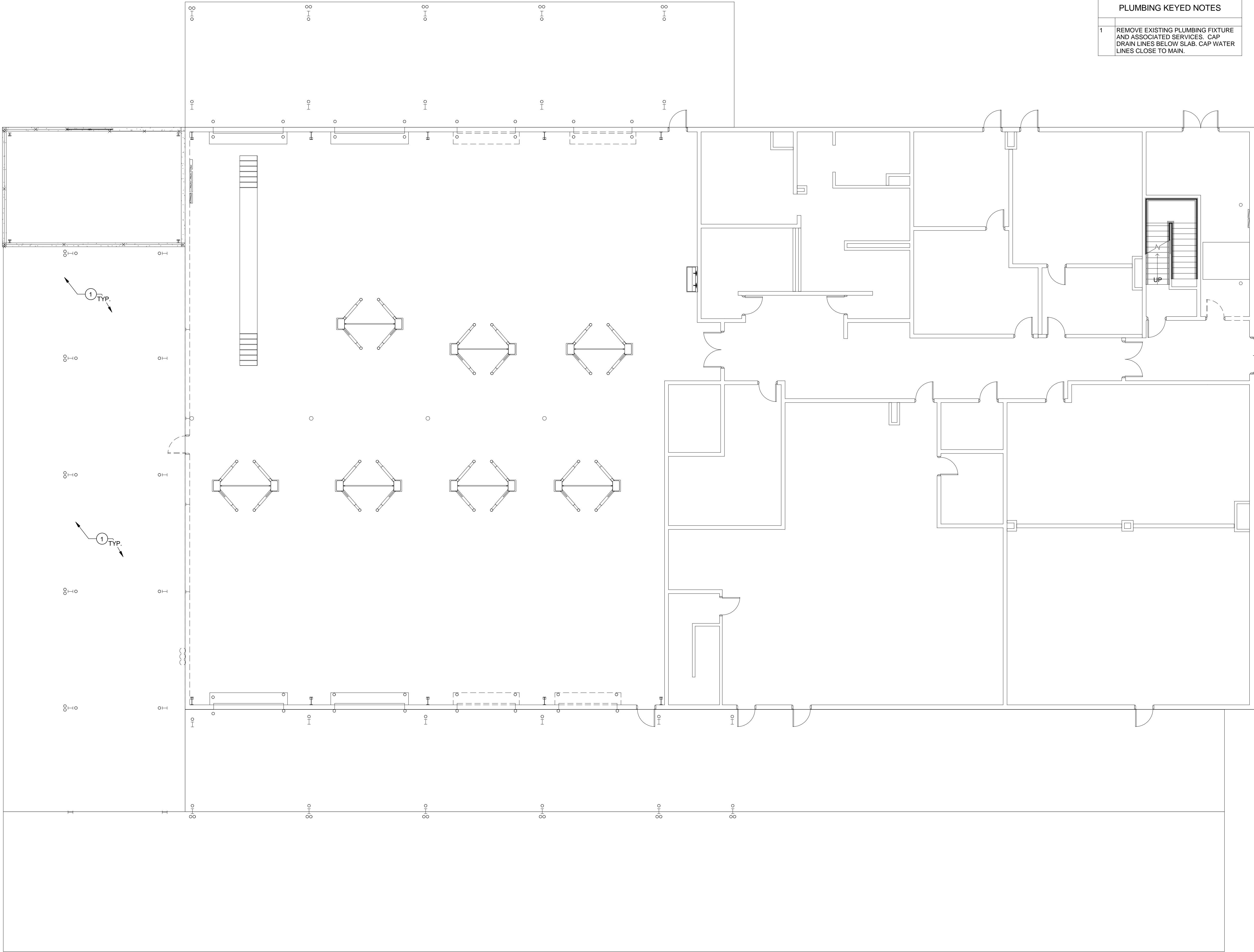
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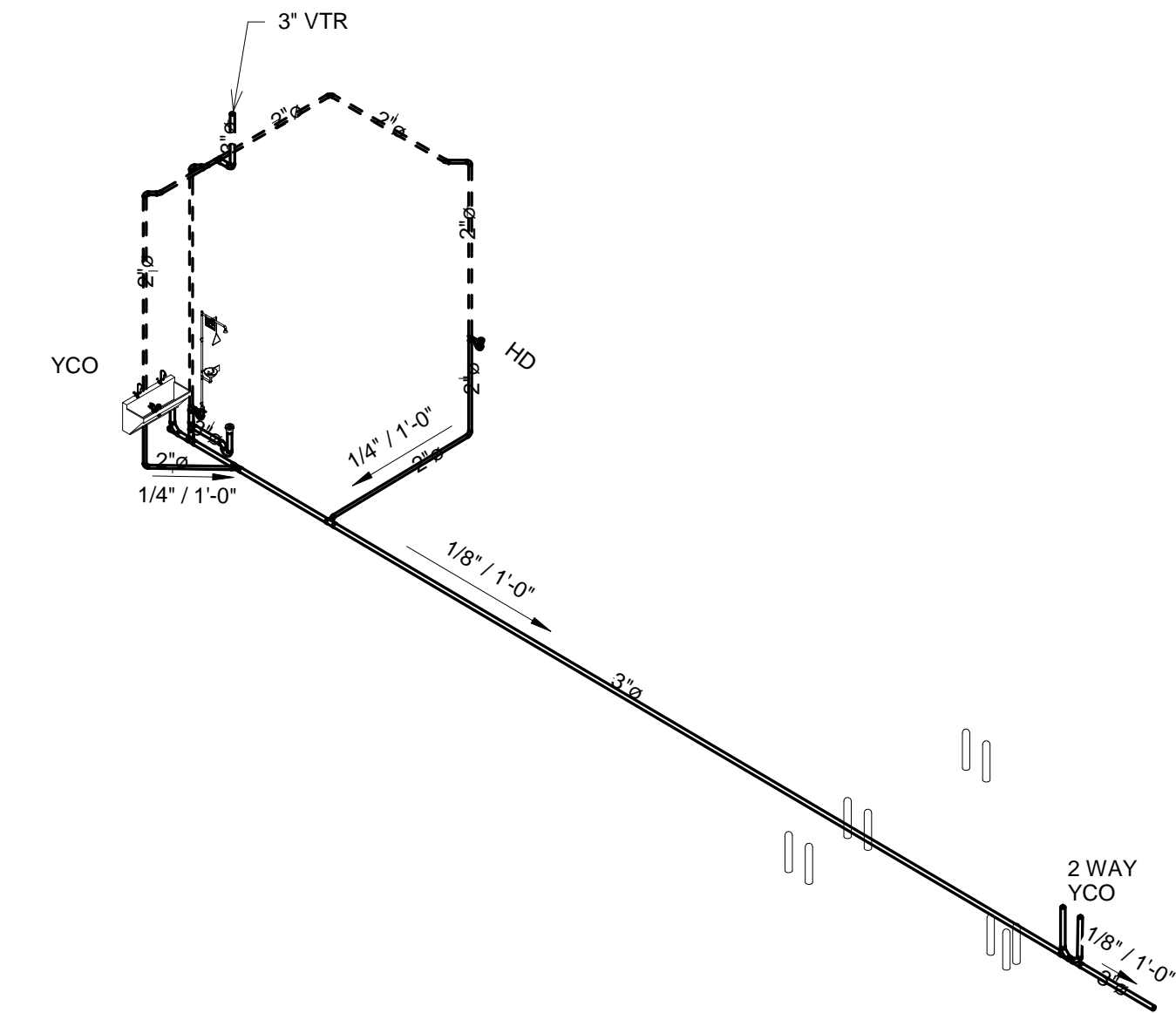
ELECTRICAL
DETAILS

E4.2



PLUMBING KEYED NOTES	
1	REMOVE EXISTING PLUMBING FIXTURE AND ASSOCIATED SERVICES. CAP DRAIN LINES BELOW SLAB. CAP WATER LINES CLOSE TO MAIN.

GENERAL NOTES - PLUMBING...	
A.	THE CONTRACTOR IS FULLY RESPONSIBLE FOR PERFORMING THE DEMOLITION WORK UNDER THIS SECTION OF THE PROJECT IN FULL COMPLIANCE WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL CODES INCLUDING THOSE PUBLISHED BY OSHA AND EPA.
B.	THE EXTENT OF DEMOLITION WORK IS INDICATED ON THE ARCHITECTURAL DRAWINGS AND BY THE REQUIREMENTS OF THIS SECTION. A VISIT TO THE SITE WILL BE REQUIRED PRIOR TO BIDDING. CONTRACTOR SHALL IDENTIFY/VERIFY ALL WATER, GAS AND SANITARY LINES BEFORE STARTING ANY DEMOLITION WORK. CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ALL UNDERGROUND UTILITIES IN AREAS OF EXCAVATION WORK.
C.	PROVIDE ALL DEMOLITION WORK REQUIRED FOR THE REMOVAL AND/OR RELOCATION OF PLUMBING FIXTURES AND EQUIPMENT AND ASSOCIATED SERVICES TO PROVIDE A COMPLETE AND OPERABLE SYSTEM UPON COMPLETION OF THE PROJECT.
D.	PLUMBING CONTRACTOR SHALL BE RESPONSIBLE TO REVIEW THE ARCH'L DOCUMENTS IN ADDITION TO THE DIVISION 15 AND 16 DOCUMENTS TO DETERMINE THE COMPLETE SCOPE OF WORK.
E.	WHERE FIXTURES OR EQUIPMENT ARE INDICATED OR REQUIRED TO BE REMOVED, THE ASSOCIATED SERVICES SHALL BE CAPPED AT A CONCEALED LOCATION.
F.	WHERE FIXTURES OR EQUIPMENT ARE INDICATED OR REQUIRED TO BE RELOCATED, THE ASSOCIATED SERVICES SHALL BE REMOVED AND CAPPED. NEW MATERIALS SHALL BE USED TO EXTEND SERVICES TO NEW LOCATION.
G.	WHERE SERVICES RUN ABOVE INACCESSIBLE CEILINGS OR IN WALLS WHICH ARE TO REMAIN UNDISTURBED, SERVICES SHALL BE CAPPED AT CONCEALED LOCATION AND ABANDONED.
H.	WHERE THE REMOVAL OF FIXTURES OR EQUIPMENT RENDERES EQUIPMENT DOWNSTREAM INOPERABLE, SERVICES SHALL BE EXTENDED TO THE DOWN-STREAM FIXTURES OR EQUIPMENT SO THAT THE FIXTURES OR EQUIPMENT IS LEFT IN OPERATING CONDITION.
I.	ALL EXISTING PLUMBING FIXTURES AND EQUIPMENT REMOVED DURING CONSTRUCTION THAT ARE NOT TO BE REUSED SHALL BE REMOVED FROM THE JOB SITE AND PROPERLY RETURNED TO THE OWNER, IF DESIRED BY OWNER.
J.	WHERE EXISTING FIXTURE OR EQPT IS TO BE RELOCATED, BE CAUTIOUS TO PREVENT DAMAGE DURING THE REMOVAL AND REINSTALLATION. WHERE DAMAGE OCCURS, THE EQUIPMENT SHALL BE REPLACED OR REPAIRED TO THE SATISFACTION AND APPROVAL OF THE ARCHITECT AT NO ADDITIONAL COST TO THE OWNER.
K.	EXISTING FIXTURES OR EQUIPMENT TO BE REUSED SHALL BE CLEANED AND REPAIRED AT THE DISCRETION OF THE ARCHITECT WHERE APPLICABLE.
L.	ALL DEVICES WITH AN (E) SYMBOL ARE EXISTING TO REMAIN. (UNO).
M.	ALL DEVICES ATTACHED TO WALLS OR CEILINGS SHALL BE REMOVED PER DEMOLITION NOTE A - L WHETHER SHOWN ON DRAWINGS OR NOT.
N.	CUTTING OF CONCRETE FLOORS SHALL BE BY MACHINE SAW. HOLES FOR PIPES (WALL OR FLOOR) SHALL BE DONE WITH CORE DRILLING EQUIPMENT WITH PRIOR APPROVAL FROM THE STRUCTURAL ENGINEERS. CONTRACTOR SHALL INFORM THE ENGINEER IF REINFORCING IS CUT OR DAMAGED WHILE MAKING OPENINGS AS REQUIRED BY DRAWINGS OR SPECIFICATIONS. PATCH AND SEAL OPENINGS AS REQUIRED. COORDINATE ALL CUTTING AND PATCHING WITH OTHER TRADES.



2 PLUMBING SEWER & VENT RISER
P1.1 SCALE: REF:

NOTE:

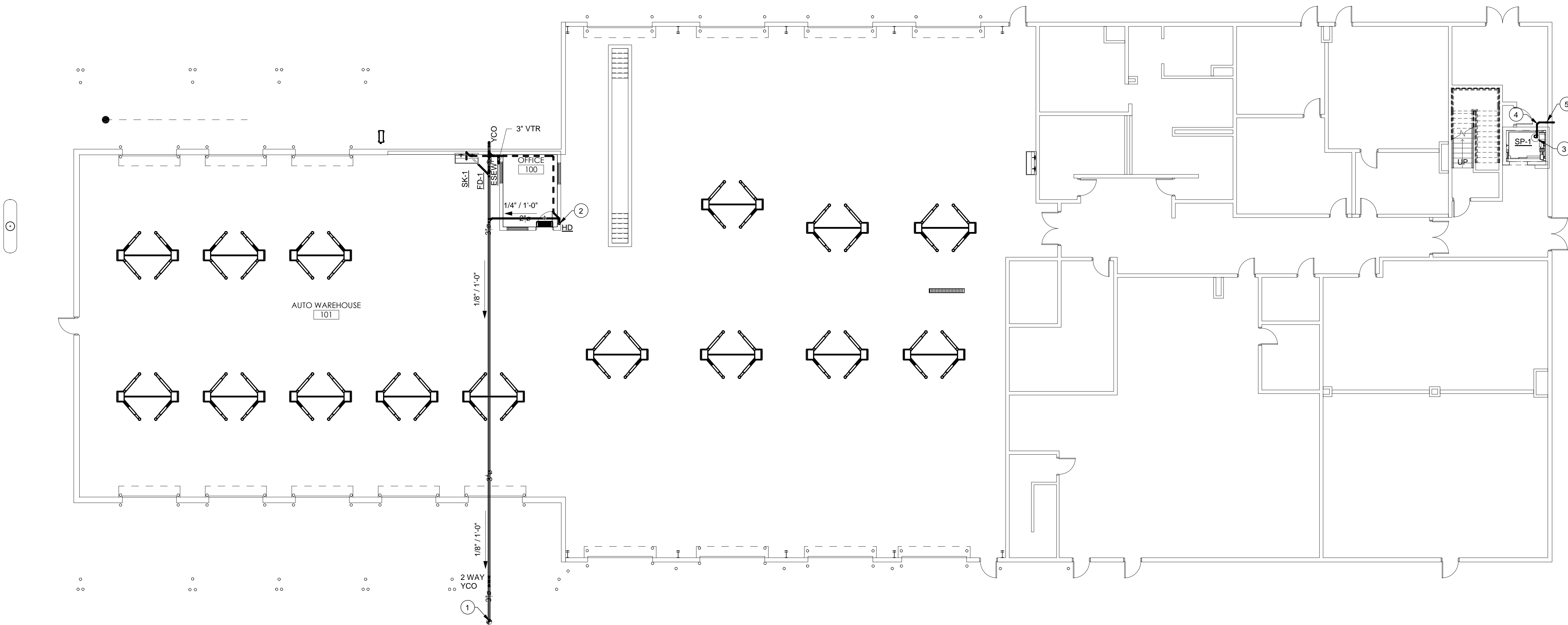
DRAWING IS SCHEMATIC IN NATURE AND SHOW THE GENERAL LAYOUT OF THE FOLLOWING SYSTEM. CONTRACTOR SHALL COORDINATE EXACT LOCATIONS OF PIPING, DEVICES AND EQUIPMENT WITH THE BUILDING ELEMENTS AND THE WORK WITH THE OTHER TRADES.

THE PLUMBING CONTRACTOR SHALL BE RESPONSIBLE FOR ALL FINAL CONNECTIONS TO PLUMBING FIXTURES AND EQUIPMENT.

THIS INCLUDE BUT NOT LIMITED TO FURNISHING AND INSTALL ALL TRAPS, DRAINS AND SUPPLIES WITH STOPS.

IT IS MANDATORY FOR GENERAL CONTRACTOR TO FIELD VERIFY AND SURVEY THE ENTIRE SITE PRIOR TO BIDDING. CONTRACTOR TO IDENTIFY ANY POSSIBLE DISCREPANCIES.

PLUMBING KEYED NOTES	
1	PLUMBER TO EXTEND AND CONNECT FLOOR WASTE LINE TO EXISTING FLOOR WASTE LINE. FIELD VERIFY EXACT POINT OF CONNECTION. CONTRACTOR SHALL VERIFY LOCATIONS, DIRECTION OF FLOW, ELEVATION, AND INVERT SLOPE OF EXISTING FLOOR WASTE LINE.
2	PROVIDE 3"HUB DRAIN FOR FAN COIL UNIT, WITH DEEP SEAL P-TRAP, IN WALL, ALONG WITH DRAIN KIT, TRAP PRIMER AND 8X8 UNIVERSAL ACCESS DOOR EQUAL TO MIFAB SERIES UA. REFER TO DETAIL 02/P3.1.
3	ELEVATOR SUMP PUMP, REFER TO DETAIL 02/P3.1.
4	PROVIDE 2" SCH. 80 PVC PIPE TO SERVE THE ELEVATOR SUMP PUMP.
5	2" SCH. 80 PVC PIPE FROM ELEVATOR SUMP PUMP UP DISCHARGE OUTSIDE BUILDING.



1 PLUMBING SEWER & VENT - OVERALL FIRST FLOOR
P1.1 SCALE: 3/32" = 1'-0" REF:

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3533 Moreland Dr. Ste A 1 Weslaco, Tx
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11720 NORTH HIRE
AUSTIN, TEXAS 78753
PH: 512.474.6526
FAX: 512.474.6761
204 E. STUBBS
STREET
EDINBURG, TX
PH: 281.384.0611
FAX: 956.386.0613

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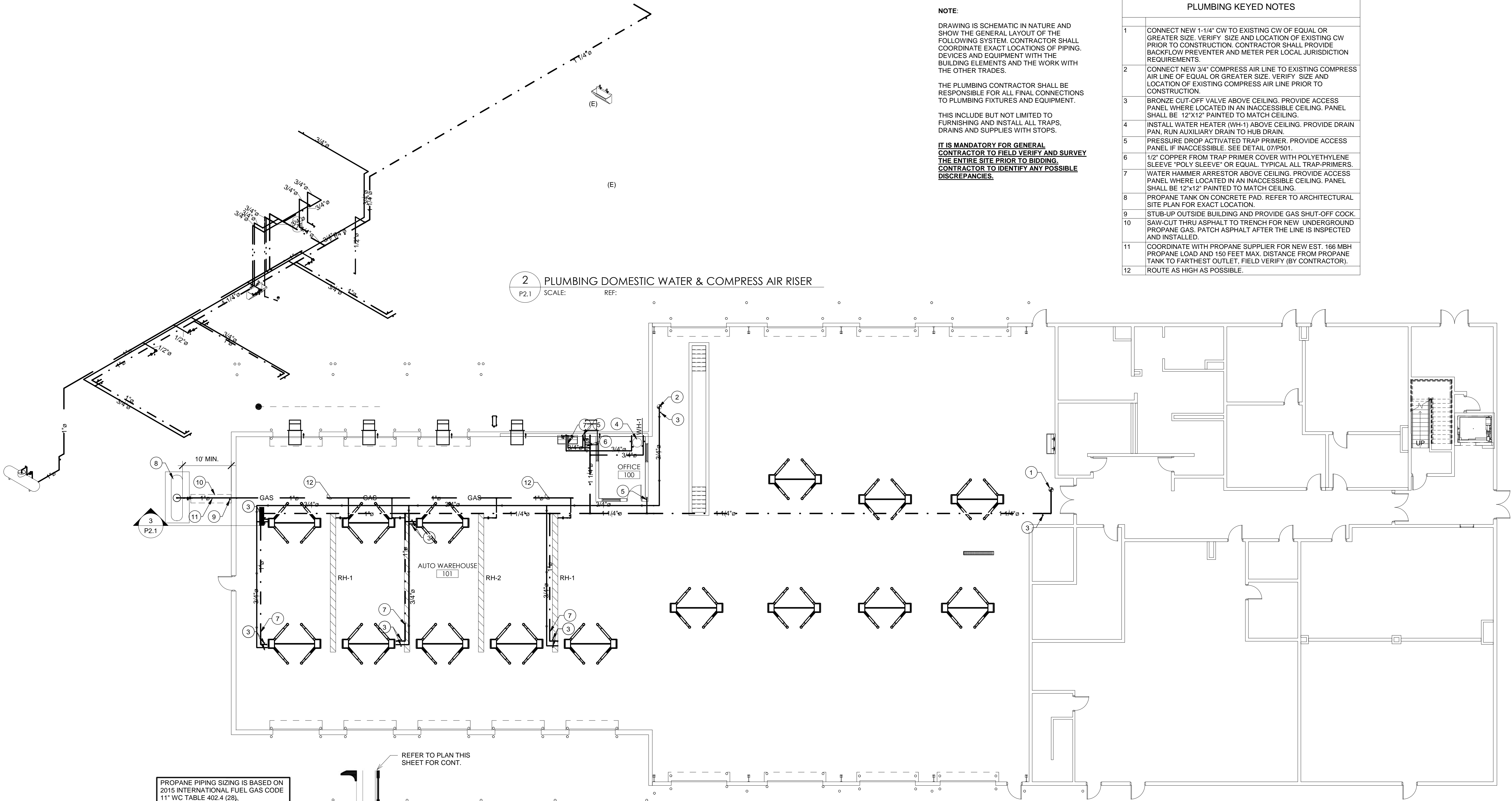
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PLUMBING
SEWER & VENT
FLOOR PLAN

P1.1



NOTE:

DRAWING IS SCHEMATIC IN NATURE AND SHOW THE GENERAL LAYOUT OF THE FOLLOWING SYSTEM. CONTRACTOR SHALL COORDINATE EXACT LOCATIONS OF PIPING, DEVICES AND EQUIPMENT WITH THE BUILDING ELEMENTS AND THE WORK WITH THE OTHER TRADES.

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IT IS MANDATORY FOR GENERAL CONTRACTOR TO FIELD VERIFY AND SURVEY THE ENTIRE SITE PRIOR TO BIDDING. CONTRACTOR TO IDENTIFY ANY POSSIBLE DISCREPANCIES.

PLUMBING KEYED NOTES	
1	CONNECT NEW 1-1/4" CW TO EXISTING CW OF EQUAL OR GREATER SIZE. VERIFY SIZE AND LOCATION OF EXISTING CW PRIOR TO CONSTRUCTION. CONTRACTOR SHALL PROVIDE BACKFLOW PREVENTER AND METER PER LOCAL JURISDICTION REQUIREMENTS.
2	CONNECT NEW 3/4" COMPRESS AIR LINE TO EXISTING COMPRESS AIR LINE OF EQUAL OR GREATER SIZE. VERIFY SIZE AND LOCATION OF EXISTING COMPRESS AIR LINE PRIOR TO CONSTRUCTION.
3	BRONZE CUT-OFF VALVE ABOVE CEILING. PROVIDE ACCESS PANEL WHERE LOCATED IN AN INACCESSIBLE CEILING. PANEL SHALL BE 12"x12" PAINTED TO MATCH CEILING.
4	INSTALL WATER HEATER (WH-1) ABOVE CEILING. PROVIDE DRAIN PAN, RUN AUXILIARY DRAIN TO HUB DRAIN.
5	PRESSURE DROP ACTIVATED TRAP PRIMER. PROVIDE ACCESS PANEL IF INACCESSIBLE. SEE DETAIL 07/P501.
6	1/2" COPPER FROM TRAP PRIMER COVER WITH POLYETHYLENE SLEEVE "POLY SLEEVE" OR EQUAL. TYPICAL ALL TRAP-PRIMERS.
7	WATER HAMMER ARRESTOR ABOVE CEILING. PROVIDE ACCESS PANEL WHERE LOCATED IN AN INACCESSIBLE CEILING. PANEL SHALL BE 12"x12" PAINTED TO MATCH CEILING.
8	PROPANE TANK ON CONCRETE PAD. REFER TO ARCHITECTURAL SITE PLAN FOR EXACT LOCATION.
9	STUB-UP OUTSIDE BUILDING AND PROVIDE GAS SHUT-OFF COCK.
10	SAW-CUT THRU ASPHALT TO TRENCH FOR NEW UNDERGROUND PROPANE GAS. PATCH ASPHALT AFTER THE LINE IS INSPECTED AND INSTALLED.
11	COORDINATE WITH PROPANE SUPPLIER FOR NEW EST. 168 MBH PROPANE LOAD AND 150 FEET MAX. DISTANCE FROM PROPANE TANK TO FARTHEST OUTLET, FIELD VERIFY (BY CONTRACTOR).
12	ROUTE AS HIGH AS POSSIBLE.

2 PLUMBING DOMESTIC WATER & COMPRESS AIR RISER
P2.1 SCALE: REF:

1 PLUMBING DOMESTIC WATER- OVERALL FIRST FLOOR
P2.1 SCALE: 3/32" = 1'-0" REF:

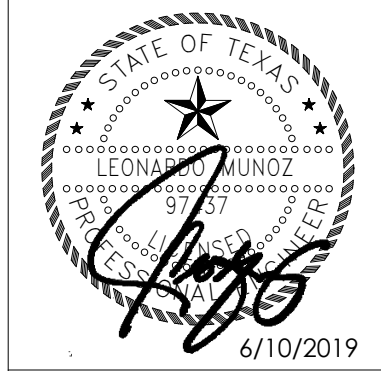
4 TYPICAL GAS CONNECTION DETAIL
P2.1 SCALE: 3/4" = 1'-0" REF:

3 PROPANE TANK PIPING DIAGRAM
P2.1 SCALE: 3/8" = 1'-0" REF: P2.1

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AUSTIN, TEXAS 78753
PH: 512.474.6526
FAX: 512.474.6761
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STREET
EDINBURG, TX
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FAX: 281.384.0613

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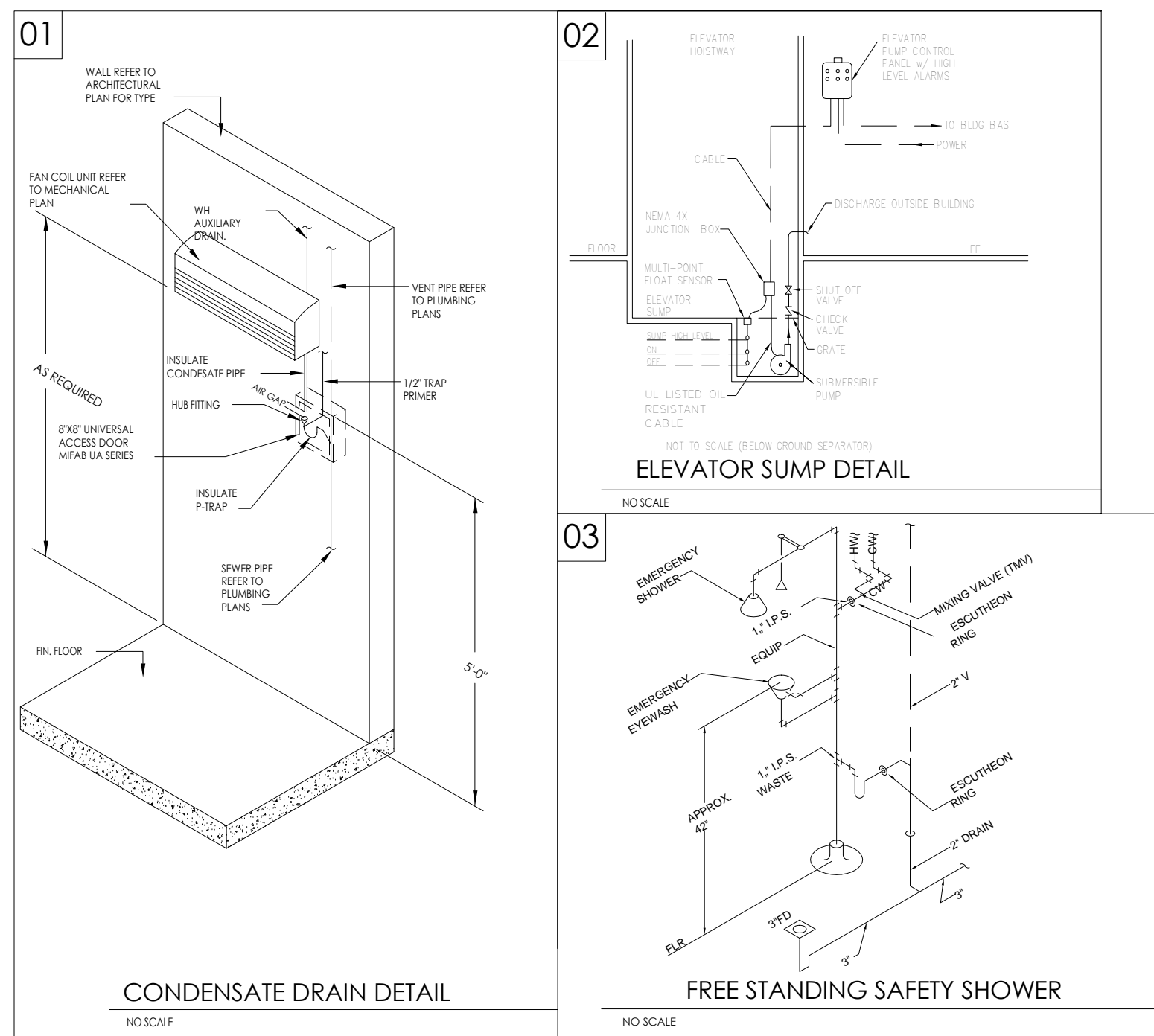
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PLUMBING
DOMESTIC
WATER FLOOR
PLAN
P2.1


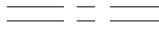













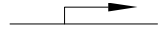





ABBREV.	DESCRIPTION
AC	ABOVE CEILING
AFF	ABOVE FINISHED FLOOR
ASA	AMERICAN STANDARDS ASSOCIATION
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
ASTM	AMERICAN SOCIETY FOR TESTING MATERIALS
AW	ACID WASTE
AWWA	AMERICAN WATER WORKS ASSOCIATION
AV	ACID VENT
BTUH	BRITISH THERMAL UNIT PER HOUR
CA	COMPRESSED AIR
CI	CAST IRON
CO	CLEANOUT
CU	COPPER
DN	DOWN
EQ	EQUAL
FCO	FLOOR CLEANOUT
FF	FINISH FLOOR
FG	FINISH GRADE
FH	FIRE HYDRANT
GAL	GALLON(S)
GALV	GALVANIZED
GW	GREASE WASTE
HB	HOSE BIBB
HP	HORSEPOWER
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
OC	ON CENTER
RD	ROOF DRAIN(S)
RE-4/P6	REFER TO DETAIL 4 DRAWING P-6
RO	REVERSE OSMOSIS
SD	STORM DRAIN
SPEC	SPECIFICATION
Typ	TYPICAL
UG	UNDERGROUND
UL	UNDERWRITERS LABORATORIES
VIR	VENT THRU ROOF
V	VACUUM
W/	WITH
WCO	WALL CLEAN OUT
YCO	YARD CLEAN OUT

PLUMBING GENERAL NOTES: (ALL SHEETS)

- A. ALL WORK AND MATERIAL SHALL BE IN COMPLIANCE WITH ALL APPLICABLE CODES AS ADOPTED AND AMENDED BY THE INSPECTING AUTHORITIES.
- B. ALL PLUMBING WORK SHALL BE INSTALLED SO AS TO AVOID CONFLICT WITH ALL ELECTRICAL WORK, MECH. WORK AND STRUCTURAL MEMBERS. COORDINATE WITH MECHANICAL, ELEC. AND STRUCTURAL FOR PROPER CLEARANCES.
- C. REFER TO ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR PHASING AND SEQUENCE OF CONSTRUCTION OF WORK.
- D. SLEEVE ALL OUTSIDE WALL, FLOOR SLAB, AND GRADE BEAM PENETRATIONS PER DETAILS AND PER CODE.
- E. LOCATE ALL PLUMBING VENTS TO ROOF (VTR) SO THAT THEY TERMINATE A MINIMUM OF 1'-0" AWAY FROM ANY VERTICAL SURFACE AND 10'-0" AWAY FROM ANY OUTSIDE AIR INTAKES.
- F. RECORD INVERT ELEVATIONS OF ALL VCS ON "AS-BUILT" DRAWINGS.
- G. MINIMUM 3" WASTE LINE BELOW FLOOR AND MINIMUM 2" WASTE RISER, UNLESS NOTED OTHERWISE (UNO).
- H. PLUMBING CONTRACTOR SHALL PAY FOR ALL UTILITY CONNECTIONS FEES, PERMITS, TESTS AND INSPECTIONS. FURNISH 3 COPIES OF INSPECTION CERTIFICATE BEFORE REQUESTING FINAL PAYMENT.
- I. PLUMBING CONTRACTOR SHALL BE RESPONSIBLE FOR PATCHING AND REPAIRING ALL AREAS WHICH ARE DAMAGED BY HIS OPERATIONS.
- J. CUTTING OF CONCRETE FLOORS SHALL BE BY MACHINE SAW. HOLES FOR PIPES (WALL OR FLOOR) SHALL BE DONE WITH CORE DRILLING EQUIPMENT WITH PRIOR APPROVAL FROM THE STRUCTURAL ENGINEERS.
- K. PRESSURE TEST ALL INSTALLATIONS PRIOR TO CONNECTING EQUIPMENTS
- L. LABEL ALL PIPING PER ANSI STANDARD.
- M. PROVIDE PROPER INSULATION ON ALL HOT WATER PIPING, STORM PIPING AND CONDENSATE PIPING.
- N. PROVIDE SHUT-OFF VALVES (STOPS) ON ALL ROUGH-INS TO FIXTURES AND EQUIPMENTS.
- O. PROVIDE ANY BACK FLOW PREVENTION DEVICE REQUIRED BY CODE OR GOVERNING AUTHORITIES. CONTRACTOR SHALL VERIFY THIS WITH CITY OR LOCAL AGENCIES AND INCLUDE COST OF SAME IN BID. CONTRACTOR TO HAVE BACK FLOWS CERTIFIED.
- P. PROVIDE WATER HAMMER ARRESTORS AS INDICATED ON THE DRAWINGS. AIR CHAMBERS NOT AN APPROVED SUBSTITUTE.
- Q. ALL EXPOSED PIPING FOR DESIGNATED DISABLED ACCESS FIXTURES SHALL BE COVERED OR OTHERWISE WRAPPED IN ACCORDANCE WITH A.D.A. REQUIREMENTS AND IDENTIFICATION.
- R. ALTERNATE MATERIALS NOT IDENTIFIED IN SPECIFICATIONS/DRAWINGS BUT APPROVED BY LOCAL AUTHORITY SHALL BE SUBMITTED TO ARCHITECT AND PLUMBING ENGINEER FOR REVIEW PRIOR TO INSTALLATION.
- S. ISOMETRIC DIAGRAMS ARE FOR SIZING PURPOSES ONLY AND SHALL NOT BE USED FOR MATERIAL TAKE-OFFS, OR BE CONSTRUED TO INDICATE ACTUAL SITE INSTALLATION.
- T. DRAWING IS DIAGRAMMATIC ONLY. CONTRACTOR SHALL COORDINATE EXACT LOCATIONS OF PIPING, DEVICES AND EQUIPMENT WITH BUILDING ELEMENTS AND THE WORK OF OTHER TRADES.
- U. EVERY FLOOR DRAIN, FLOOR SINK OR HUB DRAIN SHALL BE SERVED BY AN AUTOMATIC TRAP PRIMER, UNO.



PLUMBING SYMBOL LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	BALL VALVE		DOMESTIC COLD WATER
	CHECK VALVE		DOMESTIC HOT WATER
	GATE VALVE		DOMESTIC HOT WATER RETURN
	UNION		SANITARY SEWER VENT
	DIRECTION OF FLOW		SANITARY WASTE LINE
	WALL CLEANOUT		140° HOT WATER
	FLOOR CLEANOUT YARD CLEANOUT		SANITARY DIRECTION OF FLOW
	FLOOR SINK		BRANCH - TOP CONNECTION
	FLOOR DRAIN		PIPE RISER
	WALL HYDRANT OR HOSE BIBB		PIPE DROP
			POINT OF CONNECTION [APPROXIMATED FIELD VERIFY EXACT POINT OF CONNECTION]

- NOTE: 1. NOT ALL SYMBOLS USED ON THIS PROJECT
2. INSTALL WATER CLOSET FLUSH VALVE HANDLE TOWARDS WIDER SIDE OF WATER CLOSET OR DOOR OPENING.
3. INSTALL ADA APPROVED FLUSH VALVE HANDLE FOR ADA PLUMBING FIXTURES

PLUMBING FIXTURE SCHEDULE

MARK	FIXTURE TYPE	CONNECTION SIZE				DESCRIPTION
		San. Sewer	Vent	Cold Water	Hot Water	
SK-1	2 STATION SCRUB SINK	2"	2"	1/2"	1/2"	SLOAN STAINLESS STEEL 2-STATION WALL-MOUNTED SCRUB SINK MODEL EWM4820C. COMPLETE WITH TWO CHROME HANDLE FAUCET MODEL: LK940GNOST4H, HIGH GOOSENECK SPOUT, VANDAL-RESISTANT ANTI-HOSE AERATOR. DRAIN MODEL LK118 STAINLESS STEEL PERFORATED STRAINER GRID.
ESEW	EMERGENCY SHOWER AND EYEWASH	3"	2"	1-1/4"	3/4"	EQUAL TO BRADLEY MODEL NO. S19310BF.
EDF-1	ELECTRIC WATER COOLER REFER TO ARCH'L DRAWING FOR	2"	2"	1/2"	-	BI-LEVEL ELECTRIC WATER COOLER SHALL BE "ELKAY" MODEL NO. ESTL-8-C WITH CAPACITY OF 8.0 GALLONS. STAINLESS STEEL BASE WITH INTEGRAL DRAIN GRID AND EMBOSSED BUBBLER PAD. LEAD FREE ADA COMPLIANT. WITH ZURN CARRIER MODEL NO. Z-1225. WITH APRON MODEL NO. LKAPR-EZL TO COMPLY WITH TAS AND ADA.
FD-1	WORKSHOP AREA DRAIN	AS NOTED ON PLANS				EQUAL TO JOSAM 31120. TWO PIECE BODY WITH DOUBLE DRAINAGE FLANGE. WITH REMOVABLE SEDIMENT BUCKET AND 1/2" PRIMER TAP.

NOTES:

- 1.) INSULATE ALL WATER AND WASTE PIPING UNDER LAVATORIES WITH HANDY-SHIELD JACKET BY PLUMBEREX.
- 2.) PROVIDE SINGLE FIXTURE WATER HAMMER ARRESTORS EQUAL TO MINI-RESTER, HYDRA-RESTER SIOUX CHIEF. FOR ALL PLUMBING FIXTURES IN THE WATER SUPPLY SYSTEM.
- 3.) ALL VITREOUS CHINA FIXTURES SHALL BE WHITE.

ELEVATOR SUMP SYSTEM SCHEDULE

SUBMERSIBLE PUMP DATA						
MARK	FLOW CAP GPM	TDH	DISCH SIZE	RPM	HP	VOLT/PH
SP-1	50	15'	1 1/4"	1750	.50	125/1

WATER HEATER SCHEDULE

MARK	STORAGE GALLONS	RECOVERY GPH	DEGREE RISE DEG F	WATER TEMP LEAVING	WATER INLET	WATER OUTLET	VOLTAGE/ PHASE	ELEMENTS KW	DESCRIPTION
WH-1	30	41	60°	120°	3/4"	3/4"	208/1	6	RHEEM MODEL NO. EGSF30. ELECTRIC TANK TYPE. PROVIDE WITH 5 GALLONS EXPANSION TANK. PROVIDE DRAIN PAN.

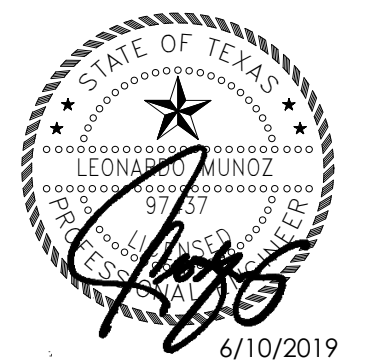
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11720 NORTH IH35
AUSTIN TEXAS 78753
PH. 512.474.6526
FAX. 512.474.6761

204 E. STUBBS
STREET
EDINBURG, TX
78539
PH. 956.386.0611
FAX. 956.386.0613

NEGRETTE & KOLAR
ARCHITECTS^{LLP}
WWW.NEKARCH.COM



Project #1809

CITY OF McALLEN
DEPT OF PUBLIC WORKS
AUTO WAREHOUSE EXPANSION
McAllen, Texas

DRAWN BY: Author

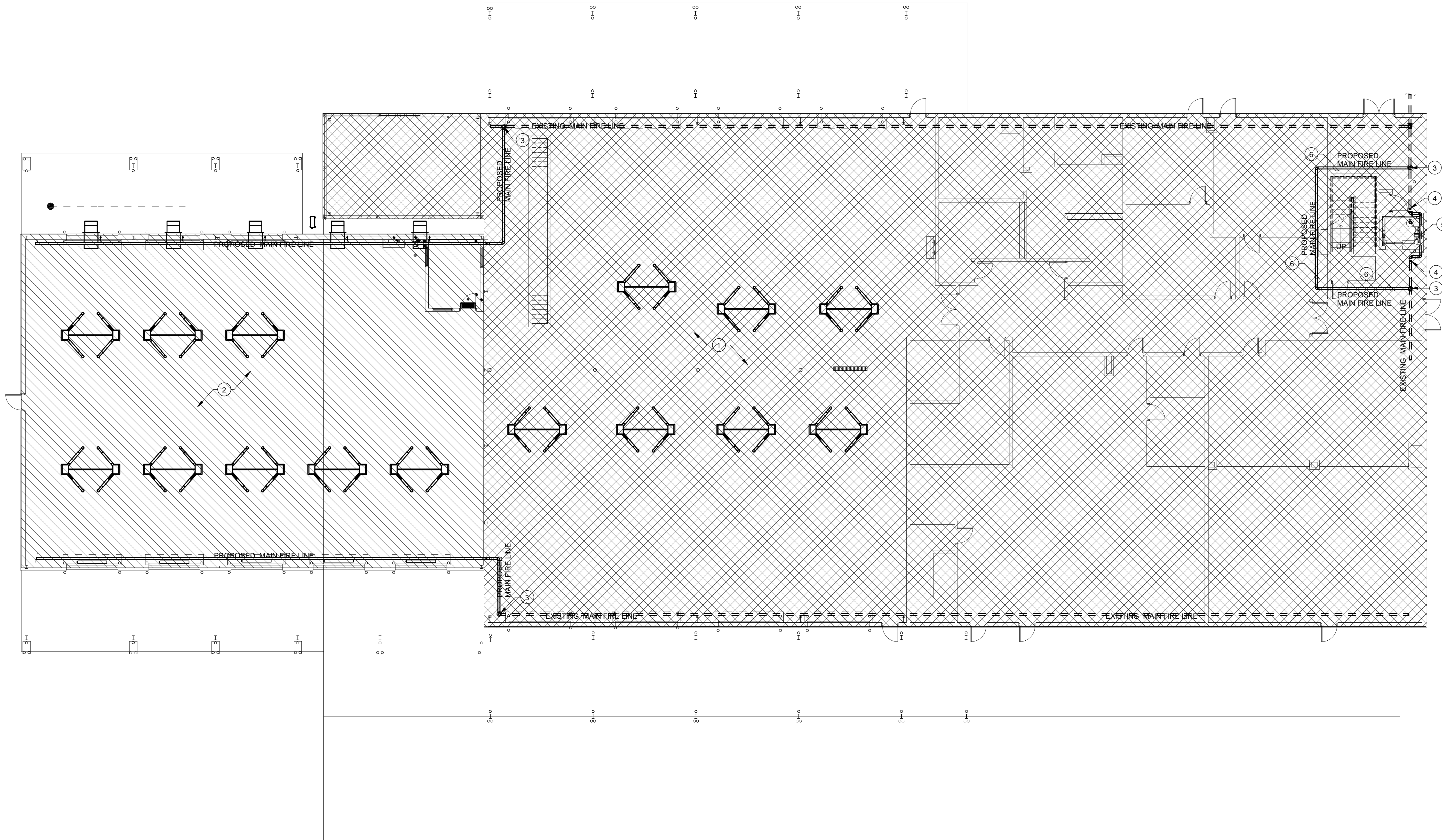
ISSUED 6/10/2019
DATE:

REVISION / ADDENDA

NO.	DATE	DESCRIPTION
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PLUMBING LEGEND & SCHEDULE

P3.1



1 FIRE PROTECTION FLOOR PLAN
FP1.1 SCALE: 3/32" = 1'-0" REF.

FIRE PROTECTION GENERAL NOTES:

- A. SYSTEM TO BE DESIGNED TO MEET ALL LATEST NFPA CODES. PLANS SHALL BE SUBMITTED TO THE CITY OF MCALLEN FOR REVIEW AND APPROVAL. FIRE MARSHAL TO BE THE FINAL APPROVING AUTHORITY FOR ALL FIRE PROTECTION WORK.
- B. CONTRACTOR TO FIELD VERIFY PIPE ROUTING AND COORDINATE WITH ALL OTHER TRADES.
- C. ALL PIPE TO BE SIZED HYDRAULICALLY.
- D. HAZARD CLASSIFICATION SHALL BE AS PER NFPA 13.
- E. ALL ABOVE CEILING PIPING WILL NEED TO BE ROUTED AROUND EXISTING CONDUITS, BEAMS, MECHANICAL DUCT WORK AND DRAIN LINES. ALL PIPE LEFT WITH TRAP WATER NEEDS TO BE PROVIDED W/ A DRAIN VALVE.
- F. SEAL ALL WALL OPENINGS W/ MORTAR OR FIRE CAULKING.
- G. ALL EXPOSED PIPE TO BE PROTECTED AGAINST FREEZING AS PER NFPA 13.
- H. EXISTING FIRE SPRINKLER SYSTEM TO REMAIN. CONTRACTOR MUST VISIT SITE TO ASSESS PRESENT CONDITION BEFORE BID DATE.
- I. PROVIDE SPRINKLER COVERAGE ON ALL SIDE OF NEW DUCT WORK.
- J. FIRE PROTECTION CONTRACTOR SHALL BE RESPONSIBLE TO REVIEW THE ARCHITECTURAL DOCUMENTS TO DETERMINE THE COMPLETE SCOPE OF WORK.
- K. COORDINATE RELOCATION OF FIRE SPRINKLER HEADS WITH ALL OTHER TRADES.
- L. ALL EXISTING SPRINKLER HEADS REMOVED DURING CONSTRUCTION ARE NOT TO BE REUSED SHALL BE REMOVED FROM THE JOB SITE.
- M. WHERE EXISTING EQUIPMENT IS TO BE RELOCATED, BE CAUTIOUS TO PREVENT DAMAGE DURING THE REMOVAL AND REINSTALLATION. WHERE DAMAGE OCCURS, THE EQUIPMENT SHALL BE REPLACED OR REPAIRED TO THE SATISFACTION AND APPROVAL OF THE ARCHITECT AT NO ADDITIONAL COST TO THE OWNER.
- N. PROVIDE ALL DEMOLITION WORK REQUIRED FOR THE REMOVAL AND/OR RELOCATION OF SPRINKLER HEADS.
- O. ALL SPRINKLER DROPS SHALL BE 1" MINIMUM.

FIRE PROTECTION KEYED NOTES

1	EXISTING BUILDING. EXISTING FIRE SPRINKLER SYSTEM TO REMAIN.
2	PROPOSED BUILDING ADDITION. EXTEND EXISTING FIRE PROTECTION SYSTEM TO THIS NEW ADDITION. CONTRACTOR COORDINATE WITH ALL OTHER TRADES.
3	CONNECT PROPOSED FIRE LINE TO EXISTING FIRE LINE OF EQUAL SIZE. VERIFY SIZE AND LOCATION OF EXISTING MAIN FIRE LINE.
4	CUT EXISTING FIRE MAIN @ THIS LOCATION AND CAP.
5	REMOVE THIS SECTION OF FIRE MAIN LINE.
6	RUN NEW 4" LINE AROUND PROPOSED ELEVATOR AND EXISTING STAIRS.

TRINITY

MEP ENGINEERING
3533 Moreland Dr. Ste A 1 Weslaco, Tx
78596 p:956.973.0500 | f:956-351-5750
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Texas Registered Engineering Firm - F10362
Project number:18.3.39

11720 NORTH IH35
AUSTIN, TEXAS 78753
PH: 512.474.6526
FAX: 512.474.6761
204 E. STUBBS
STREET
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FIRE PROTECTION
FLOOR PLAN

FP1.1