



INVITATION FOR BIDS (IFB)

FOR

Villa Tranchese Fire Protection Improvements

FOR

**HOUSING AUTHORITY OF THE
CITY OF SAN ANTONIO, TEXAS
AND
AFFILIATED ENTITIES**

IFB# 1901-910-23-4878

Prepared by:

**Department of Procurement
Of the
San Antonio Housing Authority
818 South Flores Street
San Antonio, Texas 78204**

President & CEO David Nisivoccia

**Invitation For Bids
For
Villa Tranchese Fire Protection Improvements**

The Housing Authority of the City of San Antonio, Texas and its affiliated entities d/b/a San Antonio Housing Authority ("SAHA") hereby invites qualified independent Contractors to submit bids for the fire protection improvements and associated work at the Villa Tranchese Apartments, 307 Marshall Fair Avenue, San Antonio, TX 78212.

As a part of our social mission and federal mandate, SAHA is committed to providing economic, training and educational opportunities to the low income individuals in the communities we serve. All contractors are required to recruit and hire low income individuals for new positions and provide training & educational opportunities to the greatest extent feasible for these individuals.

The IFB can be obtained by calling 210-477-6059 or online at

www.saha.org

<http://nahro.economicengine.com>

<http://www.publicpurchase.com/gems/saha,tx/buyer/public/home>

Notice: Contact with members of the SAHA Board of Commissioners, or SAHA officers and employees other than the contact person listed herein, by any prospective Bidder, after publication of the IFB and prior to the execution of a contract with the successful bidder(s) could result in disqualification of your bid. In fairness to all prospective bidder(s) during the IFB process, if SAHA meets in person with anyone representing a potential provider of these services to discuss this IFB other than at the pre-submittal meeting, an addendum will be issued to address all questions so as to insure no Bidder has a competitive advantage over another. This does not exclude meetings required to conduct business not related to the IFB or possible personal presentations after written qualifications have been received and evaluated.

HOUSING AUTHORITY OF THE
CITY OF SAN ANTONIO, TEXAS

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IFB INFORMATION AT A GLANCE

POINT OF CONTACT	Charles Bode Assistant Director of Procurement Phone: (210) 477-6703 Fax: (210) 477-6167 charles_bode@saha.org
DATE ISSUED	February 11, 2019
NON-MANDATORY PRE-SUBMITTAL MEETING	February 26, 2019 at 10:00 a.m. SAHA Central Office, 818 S. Flores, San Antonio, TX 78204
LAST DATE FOR QUESTIONS	February 27, 2019 at 2:00 p.m.
SITE VISIT	February 22 , 2019 1:00 p.m. to 4:00 pm
BID DUE DATE	March 15, 2019 at 2:00 p.m. SAHA Procurement Dept. 818 S. Flores, San Antonio, TX 78204
ANTICIPATED APPROVAL BY THE BOARD	April/May 2019
SUBMITAL REQUIREMENTS	1 (one) Original signature document marked "ORIGINAL" and 2 (two) exact copies marked "COPY" in a sealed envelope or container.

INTRODUCTION

The San Antonio Housing Authority (SAHA) is a public housing agency created by resolution of the City of San Antonio in 1938 pursuant to the Texas Housing Authorities Law (now Chapter 392 of the Texas Local Government Code) and federal law. SAHA is a unit of government and its functions are essential governmental functions. The property of SAHA is used for essential public and governmental purposes and is exempt from all taxes, including sales tax on all its purchases of supplies and services.

SAHA enters into and executes contracts and other instruments that are necessary and convenient to the exercise of its powers. SAHA maintains contractual arrangements with United States Department of Housing and Urban Development (HUD) to manage and operate its low rent public housing program and administers the Section 8 Housing Assistance Payments Programs. SAHA programs are federally funded along with development and modernization grants and rental income.

Its primary activity is the ownership and management of over 6,300 public housing units. It also administers rental assistance for almost 12,000 privately owned rental units through the Section 8 program. It operates and manages its housing developments to provide decent, safe, sanitary and affordable housing to low income families, the elderly, and the disabled, and implements various programs designed and funded by HUD.

SAHA has created a number of affiliated public facility corporations (“PFCs”) pursuant to Chapter 303 of the Texas Local Government Code (the Public Facility Corporation Act). In some instances, these PFCs own projects. In other cases, PFCs or other related entities serve as partners in partnerships that have been awarded low-income housing tax credits. SAHA’s affiliated entities own and operate over 3,000 units of affordable housing.

SAHA staff also manages the San Antonio Housing Finance Corporation (“Finance Corporation”), which is primarily a conduit issuer of bonds for developers of affordable housing projects. The Finance Corporation was created pursuant to Chapter 394 of the Texas Local Government Code (the Texas Housing Finance Corporations Act). When used herein, “SAHA” shall include its affiliated entities.

INVITATION FOR BID

1.0 GENERAL INFORMATION

- 1.1 Statement of Purpose:** The Housing Authority of the City of San Antonio and its affiliated entities (SAHA) are seeking bids from independent contractors with demonstrated professional competence and experience for the fire protection improvements and associated work at the Villa Tranchese Apartments, 307 Marshall, San Antonio, TX 78212.
- 1.2** Bidders acknowledge that submitting a bid to SAHA is not a right to be awarded a contract, but only an offer by the Bidder to perform the requirements of the IFB documents in the event SAHA decides to award a contract to that Bidder.
- 1.3 Non-Mandatory Pre-Bid Conference:** A pre-bid conference will be held at SAHA Central Office, located at 818 South Flores, San Antonio, Texas 78204 as indicated herein. The purpose of this conference is to assist Bidders in understanding of the IFB documents and required submittal documents. At this conference, SAHA will conduct an overview of the IFB documents, including attachments. Any questions concerning the scope must be presented in writing (e-mail is acceptable) to the contact person listed herein and will be answered in an addendum.
- 1.4 Bidder's Responsibilities-Contact with SAHA:** Bidders shall address all communication and correspondences pertaining to this IFB process to contact listed herein only. Bidders must not inquire or communicate with any other SAHA staff member or official (including members of the Board of Commissioners) pertaining to this IFB. Failure to abide by this requirement is cause for a bid to be disqualified. During the IFB solicitation process, SAHA will not conduct any ex parte conversations which may give one prospective Bidder an advantage over other prospective Bidders.

2.0 SAHA'S RESERVATION OF RIGHTS

- 2.1** SAHA reserves the right to reject any or all bids, to waive any informality in the IFB process, or to terminate the IFB process at any time, if deemed by SAHA to be in its best interests.
- 2.2** SAHA reserves the right not to award a contract pursuant to this IFB.
- 2.3** SAHA reserves the right to terminate a contract awarded pursuant to this IFB, at any time for its convenience upon 30 days written notice to the successful Bidder(s).
- 2.4** SAHA reserves the right to determine the days, hours and locations that the successful Bidder(s) shall provide the services called for in this IFB.

- 2.5** SAHA reserves the right to retain all bids submitted and not permit withdrawal for a period of 90 days subsequent to the deadline for receiving bids without the written consent from SAHA.
- 2.6** SAHA reserves the right to reject and not consider any bid that does not meet the requirements of this IFB, including but not necessarily limited to incomplete bids and/or bids offering alternate or non-requested services and from individuals deemed non responsible.
- 2.7** SAHA shall have no obligation to compensate any Bidder for any costs incurred in responding to this IFB.
- 2.8** SAHA reserves the right to at any time during the IFB or contract process to prohibit any further participation by a Bidder or reject any bids submitted that does not conform to any of the requirements detailed herein. Each prospective Bidder further agrees that he/she will inform SAHA in writing within five (5) days of the discovery of any item that is issued thereafter by SAHA that he/she feels needs to be addressed. Failure to abide by this timeframe shall relieve SAHA, but not the prospective Bidder, of any responsibility pertaining to such issue.
- 2.9** SAHA reserves the right to, prior to award, revise, change, alter or amend any of the instructions, terms, conditions, and/or specifications identified within the IFB documents issued, within any attachment or drawing, or within any addenda issued. All addenda will be posted on SAHA's website www.saha.org, www.publicpurchase.com and <https://nahro.economicengine.com>. Such changes that are issued before the bid submission deadline shall be binding upon all prospective Bidders.
- 2.10** In the case of rejection of all bids, SAHA reserves the right to advertise for new bids or to proceed to do the work otherwise.
- 2.11** SAHA reserves the right to, without any liability; cancel the award of any bid(s) at any time before the execution of the contract documents by all parties.
- 2.12** SAHA reserves the right to reduce or increase estimated or actual quantities in whatever amount necessary without prejudice or liability to SAHA, if:
- 2.12.1** Funding is not available,
- 2.12.2** Legal restrictions are placed upon the expenditure of monies for this category of service or supplies; or,
- 2.12.3** SAHA's requirements in good faith change after award of the contract.
- 2.13** SAHA reserves the right to make an award to more than one Bidder based on cost and the Bidder being considered responsive and responsible.

- 2.14 SAHA reserves the right to require additional information from all Bidders to determine level of responsibility. Such information shall be submitted in the form and time frame required by SAHA.
- 2.15 SAHA reserves the right to require the Contractor to keep accurate timesheets for all employees assigned to perform any project, task, or assignment resulting from this IFB and any resulting contract.
- 2.16 SAHA reserves the right to contact any individuals, entities, or organizations that have had a business relationship with the Bidder regardless of their inclusion in the reference section of the bid submittal.
- 2.17 In the event any resulting contract is prematurely terminated due to non-performance and/or withdrawal by the Contractor, SAHA reserves the right to seek monetary restitution (to include but not limited to withholding of monies owed) from the Contractor to cover costs for interim services and/or cover the difference of a higher cost (difference between terminated Contractor's rate and new company's rate) beginning the date of Contractor's termination through the contract expiration date.
- 2.18 SAHA reserves the right to amend the contract any time prior to contract execution.

3.0 **GENERAL CONDITIONS:**

- 3.1 **SPECIFICATIONS:** The Contractor shall provide the goods or services as specified in this IFB and any attached HUD Documents. Specifications are in Attachment A.
- 3.2 **REGULATORY/LICENSING:** Contractor shall comply with all applicable federal, state and local laws, rules, regulations, ordinances and codes and obtain any licenses or permits required to provide the services under this IFB. Obtaining licenses and permits shall be the sole responsibility of the successful Bidder whether or not they are known to either the SAHA or the Bidders at the time of the submittal deadline or the award.
- 3.3 **SECTION 3: Contactor is required to prepare and submit monthly reports on Section 3.** Contractor shall utilize Section 3 residents and businesses as defined in Attachment D to perform the requirements under this IFB to the greatest extent feasible and shall document such efforts monthly. There is a 30% goal for hiring Section 3 residents on any contract resulting from this RFP, a subcontracting goal of 10% for Section 3 Businesses for construction contracts and a subcontracting goal of 3% with Section 3 Businesses for non-construction contracts. Contractors will be evaluated on their performance at achieving this goal and such evaluation shall be a factor in future awards.
FAILURE TO PROVIDE A SECTION 3 PLAN MAY CAUSE THE SUBMITTAL TO BE DISQUALIFIED AS NON-RESPONSIVE.

- 3.4 SMALL, WOMAN, MINORITY BUSINESS ENTERPRISES (SWMBE):** The Proposer is required to include a plan identifying the Proposer's good faith efforts to assist SAHA in its responsibility to foster the development of small and historically under-utilized business enterprises including woman owned, minority owned, disabled veteran owned business enterprises and other business enterprises owned and recognized by HUD as having privileged status. **All** subcontracting opportunities shall be outlined in this plan and any subcontractors listed on the Subcontractor's form provided in Attachment C. **FAILURE TO PROVIDE A SWMBE PLAN MAY CAUSE THE SUBMITTAL TO BE DISQUALIFIED AS NON-RESPONSIVE.**
- 3.5 RESPONSIBILITY FOR SUBCONTRACTORS:** All requirements for the "Prime" contractor shall also apply to any and all subcontractors. It is the Prime Contractors' responsibility to insure the compliance by the subcontractors. Regardless of subcontracting, the Prime Contractor remains liable to SAHA for the performance under this IFB or any resulting contract.
- 3.6 CRIMINAL HISTORY/DRUG TESTING;** Contractor shall perform criminal history checks and drug screening tests on all employees performing work under this IFB and any resulting contract and if requested provide summaries of the results to SAHA. Prospective employees whose criminal history checks discloses a misdemeanor or felony conviction involving crimes of moral turpitude or harm to persons or property shall not be used to perform work under this IFB or any resulting contract. Contractor is required to perform drug screening of all employees and to insure acceptable test results. Criminal history and drug screening checks will be completed at the sole expense of the Contractor.
- 3.7 LIQUIDATED DAMAGES:** For each day that performance under a resulting contract from this IFB is delayed beyond the time specified for completion, the successful Bidder shall be liable for liquidated damages in the amount of \$100.00 per day. However, the timeframe for performance may be adjusted at SAHA's discretion in writing and received by the successful Bidder prior to default under any resulting contract.
- 3.8 UNACCEPTABLE EMPLOYEES:** If any employee of the Contractor is deemed unacceptable by SAHA, Contractor shall immediately replace such personnel with a substitute acceptable to SAHA.
- 3.9 UNIFORMS/BADGES:** Contractor shall provide uniforms and/or ID badges for all employees working on SAHA's properties. No employee will be allowed on SAHA's properties out of uniform and/or without an ID badge.

- 3.10 WARRANTY:** All items installed/provided under any contract resulting from this IFB must include a minimum of a two (2) year warranty from the Contractor for labor, materials, and installation except as specified otherwise herein. This period will begin on the date of “FINAL” acceptance by SAHA.
- 3.10.1** The services provided under the contract shall conform to all information contained within the IFB documents as well as applicable Industry Published Technical Specifications, and if one of the above mentioned Specifications contains more stringent requirements than the other, the more stringent requirements shall apply.
- 3.10.2** In addition to all other warranties, the warranty shall include the warranty for merchantability and the warranty of fitness for a particular purpose.
- 3.10.3** Contractor shall assign any warranties and guarantees to SAHA and provide the Contractor’s Warranty for Labor and Installation to SAHA along with all Manufacturers’ Warranty documents.
- 3.11 SUBMISSIONS:** Late submissions will not be accepted. Submissions received prior to the opening will be held in confidence until the opening.
- 3.12 PROPOSED COST:**
- 3.12.1 Base Costs:** Your proposed fee for each item is inclusive of all necessary costs to provide the proposed services, including, but not limited to: employee costs and benefits; clerical support; overhead; profit; supplies; materials; licensing; insurance, vehicle fuel, etc. Each fee proposed shall be fully “burdened” with profit and overhead costs.
- 3.12.2 Unit Prices:** Your proposed unit price for each item listed on the Unit Price Sheet, if required, shall be inclusive of all expenses incurred to perform the service under this IFB and any resulting contract. Unit Price shall include but not be limited to, employee costs and benefits, clerical support, overhead, profit, supplies, materials, equipment, licensing, insurance, bonding, vehicle fuel, etc. In case of a discrepancy between a unit price and an extension the unit price prevails.
- 3.12.3** Contractor shall provide at contractor’s own expense all equipment, labor, materials, supplies, and tools.
- 3.13 Taxes:** SAHA, as a governmental entity, is exempt from Texas State Sales and Use Taxes and Federal Excise Taxes. A letter of Tax Exemption will be provided upon request.

- 3.14 Delivery:** All costs submitted by the successful Bidder shall reflect the cost of delivering the proposed items and/or services to the locations specified within the IFB documents or within the Agreement. All costs in the bid submittal shall be quoted as FOB Destination, Freight Prepaid and allowed unless otherwise stated in this IFB.
- 3.14.1** The successful Bidder agrees to deliver to the designated location(s) on or before the date as specified in the finalized contract. Failure to deliver on or before the specified date constitutes an event of default by the successful Bidder. Upon default, the successful Bidder agrees that SAHA may, at its option, rescind the finalized contract under the termination clause herein and seek compensatory damages as provided by law.
- 3.15 “Or Equal”:** Catalogs, brand names or manufacturer’s references where provided are descriptive only and indicate type and quality desired. Bids on brands of like nature and quality will be considered unless specified otherwise. If bidding other than the referenced manufacturer, brand or trade name, Bidder must provide a complete description of product offered, and illustrations and must be included in the bid submittal. Failure to include the above referenced data will require Contractor to furnish the specified brand names, numbers, etc.
- 3.16 TYPE OF CONTRACT:** Firm fixed contract with the option to extend at the sole discretion of SAHA.
- 3.17 BONDING:** All Surety Bonds shall be issued by companies licensed to do business in the State of Texas, approved by the U.S. Treasury and “A” rated or better by A. M. Best. Acceptable Payment & Performance Bonds shall be provided to SAHA within ten (10) days after Contract execution by both parties. Individual Sureties will not be accepted.
- 3.17.1 Bid Bond:** SAHA requires a Bid Bond for this bid in the amount of 5% of the Base Bid. Bid Bond shall be submitted with the Proposal Fee Sheet. Bid Bond must be submitted with proposal. Proposals without Bid Bond will be rejected.
- 3.17.2 Performance Bond:** The Contractor must provide SAHA a 100% Performance Bond for total contract value, however if the Contractor is unable to acquire the equitable bonding that is acceptable to SAHA within ten (10) days of signed contract, then the Contractor will be deemed in breach of contract.
- 3.17.3 Payment Bond:** The Contractor must provide SAHA a 100% Payment Bond for each Project Contract executed by SAHA, however if the Contractor is unable to acquire the equitable bonding that is acceptable to SAHA within ten (10) days of signed contract, then the Contractor will be deemed in breach of contract.

3.18 Notice to Proceed: Start work date will be determined by the SAHA Project Manager and Contractor's Manager. Contractor shall not begin work until a Notice to Proceed is received from SAHA signed by the contracting officer.

3.19 COMMUNICATIONS:

3.19.1 Form: All claims, notices, demands, requests, instructions, approvals and proposals must be submitted in writing.

3.19.2 Notice to Contractor: Any Notices or Demands upon the Contractor shall be sufficiently given if delivered at the office of the Contractor stated on the signature page of the Contract or at such other office as he / she may from time to time designate in writing to SAHA or deposited in the United States mail in a sealed, postage-prepaid envelope or if delivered with charges prepaid to any telegraph company for transmission and addressed to the office of the Contractor indicated on the signature page of the contract or such other address as may be subsequently specified in writing to SAHA.

3.19.3 Notice to SAHA: All notification papers required to be delivered to SAHA or its designated representative shall, unless otherwise specified in writing to the Contractor, be delivered to attn. Procurement, SAHA at 818 South Flores, San Antonio, Texas, 78204; and any notice to or demand upon SAHA shall be sufficiently given if so delivered or deposited in the United States mail in a sealed, postage-prepaid envelope or delivered with charges prepaid to any telegraph company for transmission to SAHA at the above address or to such other address as SAHA may subsequently specify in writing to the Contractor for such purpose.

3.19.4 Receipt: Any such notice shall be deemed to have been given as of the time of actual delivery; or in the case of mailing, when the same should have been received in due course after the date of surrender to the Post Office; or in the case of telegrams, at the time of actual receipt, as the case may be.

3.20 Calculations: The Contractor is responsible for field verifying the conditions and quantities required to deliver a complete and functional project. This shall include but is not limited to: demolition, disposal, preparation, installation, overhead, profit, bonding, general liability, labor burden, weather conditions, field verified quantities, and encumbrances. All Proposers' submitted Unit Price Items must include these variables. SAHA shall not pay additional sums for a Proposer's failure to factor these conditions into the Proposals. Failure to consider any of the factors listed shall not negate the Contractor's responsibility to perform if awarded a contract under this IFB.

- 3.20.1 Estimated Quantities:** Any quantities provided herein are strictly estimates unless specified otherwise. It is the Proposer's responsibility to determine the exact quantities required to provide a complete, finished, functional, and operational product. Unit prices, if requested, are to be utilized only for additional work requested by SAHA.
- 3.21 Project Occupancy:** For the purposes of this solicitation the development shall be considered fully occupied. The project site may also have various construction zones, phasing, mobilization, as well as other Contractors working on-site. Proposers must include these variables in their proposed fees. SAHA shall not pay additional sums for a proposer's failure to factor these conditions into their submittal.
- 3.22 Time for Completion:** The Contractor shall immediately mobilize and commence work at the time stipulated in the Notice to Proceed to the Contractor and shall be fully completed within **300 days** unless specified otherwise in contractor's response.
- 3.23 Safety:** Subject to prior approval by SAHA as to size, design, type and location, and to local regulations, the Contractor and his / her subcontractors shall erect Temporary Safety Signs for purposes of identification and controlling traffic. The Contractor shall furnish, erect, and maintain such signs as may be required by safety regulations and as necessary to safeguard life and property.
- 3.24 Builders Risk:** Contractor is required to acquire Builder's Risk Insurance for any project or projects resulting from this solicitation. In any case SAHA will not be responsible for any loss to Contractor's tools, materials, supplies, the building or project or any other coverage normally covered under Builder's Risk Insurance. See HUD form 5370 attached.
- 3.25 Storage:** The Contractor and his/her subcontractors may maintain with approval by the SAHA Property & Project Managers various Storage Facilities on the site as may be necessary in the proper conduct of the work. These shall be located to cause no interference with any work to be performed on the site by the Contractor or others. The Contractor shall consult with SAHA regarding the location(s) of these facilities on each site.
- 3.26 Removal of Temporary Facilities:** Upon completion of the project, or as directed by SAHA, the Contractor shall remove all temporary structures and facilities they installed from the site and leave the premises in equal or better condition than it was at turnover.

3.27 Final Inspection:

3.27.1 Notice: The Contractor shall provide prompt written notification to SAHA when all work is completed. A final project inspection shall be made when all work is completed. Until the final inspection has been made and project accepted by SAHA, SAHA shall not advance any of the retainage or make the final payment to the Contractor without the approval and concurrence of the Contracting Officer.

3.27.2 Inspection Date: Upon receipt of the Contractor's notification of the date when the work has been completed, SAHA shall conduct a final Inspection within 2 calendar days.

3.27.3 Inspection Participants: The final inspection shall be conducted by a SAHA representative/s, any System Manufacturer's Representative/s, and the Contractor's representative/s at a minimum.

3.27.4 Inspection Conference: The inspection team shall meet after completing the final inspection to determine whether the work has been completed in accordance with these specifications and produce a Punch List Schedule which describes any minor items of incomplete or unsatisfactory work and document if there are any major deficiencies which must be corrected by the Contractor and additional inspections scheduled prior to contract settlement.

3.28 Settlement Documents: The settlement document shall state that the work was completed in accordance with the construction documents, including change orders except any minor items identified on SAHA's proposed certificate of completion, the total amount due the Contractor and a separately stated amount for each unsettled claim against SAHA. It shall also state that SAHA is released of all liens and all claims except those expressly stated in the Contractor's release and that wages paid to laborers or mechanics were consistent with the wage rate requirements of the contract and there are no outstanding claims for unpaid wages, materials, or supplies.

3.29 Wage Rate: The Davis Bacon and Related Acts wage and reporting requirements apply to this project.

4.0 CONDITIONS TO BID:

4.1 Pre-Qualification: Bidders will not be required to pre-qualify in order to submit a bid. However, all Bidders will be required to submit adequate information showing that the bidder is qualified to perform the required work (i.e. Profile of Firm Form, Attachment C). Failure by the prospective Bidder to provide the requested information may, at SAHA's discretion, eliminate that Bidder from consideration, provided that all Bidders were required to submit the same information.

4.2 IFB Forms, Documents, Specifications and Drawings:

- 4.2.1** It shall be each Bidder's responsibility to examine carefully and, as may be required, properly complete all documents issued pursuant to this IFB.
- 4.2.2** Unless otherwise instructed, specifications and drawings (if provided) do not purport to show all of the exact details of the work. They are intended to illustrate the character and extent of the performance desired under the proposed contract and may be supplemented or revised from time to time.

4.3 Submission and Receipt by SAHA:

- 4.3.1 Time for Receiving Bids:** Bids received prior to the submittal deadline shall be securely kept, unopened, by SAHA. No bid received after the designated deadline shall be considered.
- 4.3.1.1** Bidders are cautioned that any bid submittal that is time-stamped as being received by SAHA after the exact time set as the deadline for the receiving of bids shall be returned unopened to the Bidder. Any such bids inadvertently opened shall not be considered, but shall be ruled to be invalid. No responsibility will attach to SAHA or any official or employee thereof, for the pre-opening of, or the failure to open a bid not properly addressed and identified.
- 4.3.1.2** A total of one (1) original signature copy (marked "Original") and 2 exact copies (marked "Copy") shall be forwarded to the Procurement Dept. with the Bidder's name and return address and addressed as follows:

IFB # {Insert Number}
{Insert Exact Title of IFB}
{Insert Month, day, year, Time of Bid Opening}
The Housing Authority of the City of San Antonio
Procurement Department
818 S. Flores
San Antonio, Texas 78204

- 4.3.2 Withdrawal of Bids:** Bids may be withdrawn as detailed in attached HUD Document (Attachment B). Negligence on the part of the Bidder in preparing his/her bid confers no right of withdrawal or modification of his/her bid after such bid has been received and opened.

4.3.2.1 Procedure to withdraw bid submittal: A request for withdrawal of a bid due to a purported error need not be considered by SAHA unless filed in writing by the Bidder within 48 hours after the bid deadline. Any such request shall contain a full explanation of any purported error and shall, if requested by SAHA, be supported by the original calculations on which the bid was computed, together with a certification and notarization thereon that such computation is the original and was prepared by the Bidder or his/her agent, who must be identified on the notarized form. The foregoing shall not be construed that such withdrawal will be permitted, as SAHA retains the right to accept or reject any proposed withdrawal for a mistake.

4.4 Questions/Inquires:

4.4.1 A Bidder may inquire or question any of the bid documents or any part of the information contained therein, by submitting, in writing to the contact person listed herein, prior to the question submission deadline specified herein, a complete and specific explanation as to what he/she is requiring clarification. SAHA reserves the right to issue a revision to the applicable IFB requirements or may reject the Bidder's request.

4.4.2 Bidders must propose services that meet the requirements of the IFB documents. Substitutions to the specification and/or approved "equal" requests may be discussed at the scheduled pre-bid conference (if scheduled). All verbal instructions issued by the SAHA officers not already listed within the IFB documents shall only become official when issued as addenda or as a written answer issued pursuant to receipt of a written question.

5.0 FORM OF BID: The bid shall be submitted in the following manner. Failure to submit the bid in the manner specified may result in a premature opening of, post-opening of, or failure to open and consider that bid and may be cause for elimination of that Bidder from consideration for award.

5.1 Tab 1, Form of Bid, Bid Fee Sheet, and Bidder's Certification: These Forms are attached hereto as Attachment F to this IFB document. These Forms must be fully completed, and submitted under this tab. Bid Bond is also placed under this tab. Any exceptions to the specifications or terms must be placed under this tab and "CLEARLY" labeled as such. Placement elsewhere shall render them null and void and they will not be considered.

5.2 Tab 2, HUD Forms and Conflict of Interest Questionnaire: These Forms are attached hereto as Attachment B to this IFB document and must be completed, executed where provided thereon and submitted under this tab.

5.3 Tab 3, Profile of Firm Form: The Profile of Firm Form is attached hereto as Attachment C to this IFB document. This two-page Form must be completed, executed and submitted under this tab.

5.4 Tab 4, Client Information: The Bidder shall submit three former or current clients, preferably other than SAHA, for whom the Bidder has performed similar or like rehabilitation services to those being proposed herein. The list shall, at a minimum, include for each reference:

- 5.4.5.1** The client's name;
- 5.4.5.2** The client's telephone number and full address;
- 5.4.5.3** Detailed description of services provided to the client;
- 5.4.5.4** Beginning date of service;
- 5.4.5.5** Completion or projected completion date, and
- 5.4.5.6** Is project Over/Under budget and construction schedule.

5.5 Tab 5, Joint Venture/Partnerships: The Bidder shall identify if this bid is a joint venture or partnership with another entity. Please remember that all information required from the Bidder under the proceeding or subsequent tabs must also be included for any joint venture or partner. One entity must be designated as the primary contact for the joint venture or partnership in the bid. Include a Profile of Firm Form for each entity. If no joint venture or partnership exists or will not be utilized, please provide this statement, "NO JOINT VENTURE/ NO PARTNERS"

5.6 Tab 6, Subcontractors: Bidders must provide SAHA with the name, contact information to include address, phone number, email address, core area of business, and years of expertise for each subcontractor and supplier and the minority status of each. A Profile of Firm Form must be completed for each subcontractor and included in this Tab. Bidder must realize that the actual usage of the subcontractor will be contingent upon SAHA's prior written approval, and Bidder remains responsible to SAHA for any and all services and goods provided pursuant to this IFB and any resulting contract. If no subcontractors will not be utilized, please provide this statement, "NO SUBCONTRACTORS" "Contractor intends to perform all work detailed in this IFB".

5.6.1 Subcontracting Opportunities: SAHA has identified the following opportunities for the use of Section 3 and SWMBE sub-contractors:

- Electrical
- Concrete
- Painting
- Plumbing

This list should not be considered as all inclusive or mandatory.

- 5.7 Tab 7, Section 3 Business Preference:** Any Bidder claiming a Section 3 Business Preference, shall under this tab include the fully completed and executed Section 3 applicant certification form for low-income employees for whom Bidder is seeking the preference, verification of total number of full-time employees, names and addresses of low-income residents who are Bidders employees. **Note: If you qualify as a Section 3 Business Concern, your bid will receive a preference over other bids as specified in Attachment D.**
- 5.8 Tab 8, Small/Minority/Disadvantaged/Veteran Business Enterprise Utilization Plan:** The Bidder is required to include hereunder a plan to assist SAHA in its responsibility to foster the development of small and historically under-utilized business enterprises by identifying subcontracting opportunities with SWMBE companies. Contractor is required to show a good faith effort to employ SWMBE firms in the execution of this project. **FAILURE TO PROVIDE A S/W/MBE PLAN MAY CAUSE THE RESPONSE TO BE DISQUALIFIED AS NON-RESPONSIVE.**
- 5.9 Tab 9, Section 3 Good Faith Effort Compliance Plan:** Bidders are required to complete and submit the SECTION 3 PROGRAM GOOD FAITH EFFORT COMPLIANCE PLAN outlining their efforts to employ qualified Section 3 businesses or persons. The goal as stated in the Good Faith Effort Compliance Plan is thirty percent of new hires for Section 3 persons per contract. The subcontracting goal is ten percent for Section 3 Businesses for construction contracts and three percent for Section 3 Businesses for non-construction contracts. SAHA will provide a listing of qualified Section 3 Businesses upon request. **FAILURE TO PROVIDE THE SECTION 3 PROGRAM GOOD FAITH EFFORT COMPLIANCE PLAN MAY CAUSE THE RESPONSE TO BE DISQUALIFIED AS NON-RESPONSIVE**
- 5.10 Tab 10, Financial Viability and Other Information:** Financial ability to provide such services to include copies of 3 most recent years of financial statements (profit and loss and cash flow minimum) and most recent audit if available. The Bidder may also include hereunder any other general information and copies of any licenses held or required.
- 5.11 Bid Submittal Binding Method:** It is preferable and recommended that the Bidder bind the bid submittals in such a manner that SAHA can, if needed, remove the binding (i.e. "comb-type, etc.) or remove the pages from the cover (i.e. 3-ring binder, etc.) to make copies then return the bid submittal to its original condition.

6.0 MISTAKE IN BID/DISQUALIFICATION

- 6.1** After a bid has been opened it may not be changed for the purpose of correcting an error in the pricing. This does not affect the common law right of the bidder to withdraw a bid due to a material mistake in the bid.

6.2 Irregular Bid Submittal: A bid shall be considered irregular for any one of the following reasons, any one or more of which may be reason for rejection:

6.2.1 If the forms furnished by SAHA are not used or are altered or if the bid costs are not submitted as required and where provided.

6.2.2 If all requested completed attachments do not accompany the bid submittal.

6.2.3 If there are unauthorized additions, conditional or alternate bids, or irregularities of any kind which may tend to make the bid incomplete, indefinite or ambiguous as to its meaning or give the Bidder submitting the same a competitive advantage over other Bidders.

6.2.4 If the Bidder adds any provisions reserving the right to accept or reject any award or to enter into a contract pursuant to an award.

6.2.5 If the individual cost bid items submitted by a specific Bidder are unbalanced in the sense that the listed price of any cost item departs by more than 25% from SAHA's cost estimate for that item.

6.3 Disqualification of Bidders: Any one or more of the following shall be considered as sufficient for the disqualification of a prospective Bidder and the rejection of his/her bid:

6.3.1 Evidence of collusion among prospective Bidders. Participants in such collusion will receive no recognition as Bidders or Proposer for any future work with SAHA until such participant shall have been reinstated as a qualified Bidder or Proposer. The names of all participants in such collusion shall be reported to HUD and any other inquiring governmental agency.

6.3.2 More than one bid for the same work from an individual, firm, or corporation under the same or different name(s).

6.3.3 Lack of competency, lack of experience and/or lack of adequate machinery, plant and/or other resources.

6.3.4 Unsatisfactory performance record as shown by past work for SAHA or with any other local, state or federal agency, judged from the standpoint of workmanship and progress.

6.3.5 Incomplete work, which in the judgment of SAHA, might hinder or prevent prompt completion of additional work, if awarded.

6.3.6 Failure to pay or satisfactorily settle all bills due on former contracts still outstanding at the time of letting.

6.3.7 Failure to comply with any qualification requirements of SAHA.

6.3.8 Failure to list, if required, all subcontractors (if subcontractors are allowed by SAHA) who will be employed by the successful Bidder(s) to complete the work of the proposed contract.

6.3.9 As required by the IFB documents, failure of the successful Bidder to be properly licensed by the City, County and/or the State of Texas and/or to be insured by a commercial general liability policy and/or worker's compensation policy and/or business automobile liability policy, if applicable. If a Bidder receives an award unless otherwise waived in the Contract, the Contractor will be required to provide original certificates of the following insurance requirements to SAHA within 10 days of contract signature:

6.3.10 Any reason to be determined, in good faith, to be in the best interests of SAHA.

7.0 Award of Bids(s): Bidders shall be recommended for award if they are deemed responsive and responsible and provide the "Best Value" to SAHA. In determining the best value SAHA may consider:

7.4.1 The purchase price;

7.4.2 The reputation of the bidder and his goods or services;

7.4.3 The quality of the goods or services;

7.4.4 The extent to which the goods or services meet SAHA's needs;

7.4.5 The total long term cost;

7.4.6 Any relevant criteria listed herein;

8.0 INSURANCE: If a Bidder receives an award and unless otherwise waived in the Contract, the Contractor will be required to provide an original Certificate of Insurance confirming the following minimum requirements to SAHA within 10 days of contract signature:

Table on Next Page.

Professional Liability	Required Limits
SAHA and its affiliates must be named as an Additional Insured and be a Certificate Holder. This is required for vendors who render observational services to SAHA such as appraisers, inspectors, attorneys, engineers or consultants.	\$1,000,000 Not Applicable to this Bid
Business Automobile Liability	Required Limits
SAHA and its affiliates must be named as an additional insured and as the certificate holder. This is required for any vendor that will be using their vehicle to do work on SAHA properties.	\$500,000 combined Single limit, per occurrence
Workers Compensation and Employer's Liability	Required Limits
Workers' Compensation coverage is Statutory and has no pre-set limits. Employer's Liability limit is \$500,000. Workers' Compensation is required for any vendor made up of more than two persons. A Waiver of Subrogation in favor of SAHA must be included in the Workers' Compensation policy. SAHA and its affiliates must be a Certificate Holder.	Statutory Employer's Liability is \$500,000
Commercial General Liability	Required Limits
This is required for any vendor who will be doing hands on work at SAHA properties. SAHA and its affiliates must be named as an Additional Insured and as the Certificate Holder.	\$1,000,000 per accident \$2,000,000 aggregate

9.0 INVOICING:

- 9.1** Contractor(s) will only be allowed to invoice for the cost of services/goods in compliance with his/ her bid or best and final offer as accepted by SAHA.
- 9.2** Invoices must contain a complete description of the work or service that was performed, the contract price for each service, the purchase order number, contract number (if applicable), date of service, and address of service location or delivery address.
- 9.3** Contractor(s) must submit a separate invoice for each purchase order issued by SAHA unless prior approval is obtained from SAHA.
- 9.4** If applicable, SAHA may make progress payments approximately every 30 days as the work proceeds if work meets owner's standards, as approved by the Contracting Officer. SAHA may, subject to written determination and approval of the Contracting Officer, make more frequent payments to contractors which are qualified small businesses in accordance with HUD documents.
- 9.5** Upon the Award of Contract, Contractor shall complete the direct deposit form from SAHA to process all payments electronically to insure prompt and efficient payment of all invoices.
- 9.6** If offered by Contractor, SAHA seeks a discount for early payment. SAHA shall only take such a discount if earned.
- 9.7** To insure prompt and timely payment of invoices, unless utilizing a progress payment schedule, invoices shall be sent to the following address:

Email invoices to: Accounts_Payable@saha.org

If the contractor does not have the capability to email invoices they may be sent to the following address:

San Antonio Housing Authority
Finance and Accounting
P.O. Box 830428
San Antonio, TX 78283-0428

- 9.8** Contractor shall invoice SAHA within 60 days after the delivery of the goods or service. If contractor fails to invoice within 60 days SAHA reserves the right to not pay the invoice.

10.0 RIGHT TO PROTEST:

- 10.1** Rights: Any prospective or actual proposer or contractor, who is allegedly aggrieved in connection with the solicitation of a proposal or award of a contract, shall have the right to protest. Such right only applies to deviations from laws, rules, regulations, or procedures. Disagreements with the evaluators' judgments as to the number of points scored are not reasons for an appeal. An alleged aggrieved protestant claiming this right is hereby informed that these regulations do not provide for administrative appeal as a matter of right for that alleged aggrieved protestant.

10.1.1 Definition: An alleged aggrieved "protestant" is a prospective proposer or proposer who feels that he/she has been treated inequitably by SAHA and wishes SAHA to correct the alleged inequitable condition or situation.

10.1.2 Eligibility: To be eligible to file a protest with SAHA pertaining to an RFP or contract, the alleged aggrieved protestant must have been involved in the RFP process in some manner as a prospective proposer (i.e. recipient of the RFP documents) when the alleged situation occurred. SAHA has no obligation to consider a protest filed by any party that does not meet these criteria.

10.1.3 Procedure: Any actual or prospective contractor may protest the solicitation or award of a contract for material violation of SAHA's procurement policy. Any protest against a SAHA solicitation must be received before the due date for receipt of Proposals or proposals and any protest against the award of a contract must be received within ten calendar days after contract award or the protest will not be considered.

All protests must be in writing and submitted to the Director of Procurement for a written decision. The Director of Procurement shall make a recommendation to the Contracting Officer who shall issue a written decision and findings to the Contractor within 30 days from receipt of the written protest. This decision is then appealable to the Board of Commissioners within 30 days of receipt of the written decision. Appeals which are not timely filed will not be considered and the decision becomes final. All appeals shall be marked and sent to the address as listed in the example below:

APPEAL OF IFB NO. {Insert IFB # here}
San Antonio Housing Authority
Procurement Department
818 South Flores,
San Antonio, TX 78204

11.0 ADDITIONAL CONSIDERATIONS:

- 11.1 Government Standards:** It is the responsibility of the prospective Bidder to ensure that all items and services proposed conform to all local, state and federal law concerning safety (OSHA) and environmental control (EPA and Bexar County Pollution Regulations) and any other enacted ordinance, code, law or regulation. The successful Bidder shall be responsible for all costs incurred for compliance with any such possible ordinance, code, law or regulation. No time extensions shall be granted or financial consideration given to the successful Bidder for time or monies lost due to violations of any such ordinance, code, law or regulations that may occur.
- 11.2 Work on SAHA Property:** If the successful Bidder's work under the contract involves operations on SAHA premises, the successful Bidder shall take all necessary precautions to prevent the occurrence of any injury to persons or property during the progress of such work and shall immediately return said property to a condition equal to or better than the existing condition prior to the commencement of work at the site at no cost to SAHA.
- 11.3 Estimated Quantities:** Unless otherwise indicated, any quantities shown are estimates only and are used to evaluate the responses and may or may not reflect anticipated purchases. SAHA does not guarantee any minimum purchase quantity.
- 11.4 Official, Agent and Employees of the SAHA Not Personally Liable:** It is agreed by and between the parties hereto that in no event shall any official, officer, employee, or agent of the SAHA in any way be personally liable or responsible for any covenant or agreement herein contained whether expressed or implied, nor for any statement, representation or warranty made herein or in any connection with this agreement.

- 11.5 Subcontractors:** Unless otherwise stated within the IFB documents, the successful Bidder may not use any subcontractors to accomplish any portion of the services described within the IFB documents or the contract without the prior written permission of SAHA. Also, any substitution of subcontractors must be approved in writing by SAHA prior to their engagement.
- 11.6 Salaries and Expenses Relating to the Successful Proposers Employees:** Unless otherwise stated within the IFB documents, the successful Bidder shall pay all salaries and expenses of, and all Federal, Social Security taxes, Federal and State Unemployment taxes, and any similar taxes relating to its employees used in the performance of the contract. The successful Bidder further agrees to comply with all Federal, State and local wage and hour laws and all licensing laws applicable to its employees or other personnel furnished under this agreement.
- 11.7 Independent Contractor:** Unless otherwise stated within the IFB documents or the contract, the successful Bidder is an independent contractor. Nothing herein shall create any association, agency, partnership or joint venture between the parties hereto and neither shall have any authority to bind the other in any way.
- 11.8 Severability:** If any provision of this agreement or any portion or provision hereof applicable to any particular situation or circumstance is held invalid, the remainder of this agreement or the remainder of such provision (as the case may be), and the application thereof to other situations or circumstances shall not be affected thereby.
- 11.9 Waiver of Breach:** A waiver of either party of any terms or conditions of this agreement in any instance shall not be deemed or construed as a waiver of such term or condition for the future, or of any subsequent breach thereof. All remedies, rights, undertakings, obligations, and agreements contained in this agreement shall be cumulative and none of them shall be in limitation of any other remedy, right, obligation or agreement of either party.
- 11.10 Time of the Essence:** Time is of the essence as to each provision in which a timeframe for performance is provided in this IFB. Failure to meet these timeframes may be considered a material breach, and SAHA may pursue compensatory and/or liquidated damages under the contract.
- 11.11 Limitation of Liability:** In no event shall SAHA be liable to the successful Bidder for any indirect, incidental, consequential or exemplary damages.
- 11.12 Indemnification.** The Proposer shall indemnify and hold harmless SAHA and its officers, agents, representatives, and employees from and against all claims, losses, damages, actions, causes of action and/or expenses resulting from, brought for, or on account of any bodily injury or death of an employee of the Proposer, its agent, or its subcontractor of any tier received or sustained by any persons or property growing out of, occurring, or attributable to any work performed under or related to this Agreement, to the extent resulting in whole or

in part from the negligent acts or omissions of the Proposer, any subcontractor, or any employee, agent or representative of the Proposer or any subcontractor. **PROPOSER ACKNOWLEDGES AND AGREES THAT THIS INDEMNITY CONTROLS OVER ALL OTHER PROVISIONS IN THE AGREEMENT, SURVIVES TERMINATION OF THIS AGREEMENT.**

For clarification purposes, Proposer shall indemnify and hold harmless SAHA, their agents, consultants and employees from and against any and all property damage claims, losses, damages, costs and expenses relating to the performance of this Agreement, including any resulting loss of use, *but only to the extent caused by the negligent acts or omissions of Proposer*, its employees, sub-subcontractors, suppliers, manufacturers, or other persons or entities for whose acts Proposer may be liable.

11.13 Public/Contracting Statutes. SAHA is a governmental entity as that term is defined in the procurement statutes. SAHA and this IFB and all resulting contracts are subject to federal, state and local laws, rules, regulations and policies relating to procurement as applicable.

11.14 Termination: Any contract resulting from this IFB may be terminated under the following conditions:

11.14.1 Consent: By mutual consent of both parties, and

11.14.2 Termination For Cause: As detailed within the attached HUD Forms.

11.14.2.1 SAHA may terminate any and all contracts for default at any time in whole or in part, if the contractor fails to perform any of the provisions of any contract, so fails to pursue the work as to endanger performance in accordance with the terms of the IFB or any resulting contracts, and after receipt of written notice from SAHA, fails to correct such failures within seven (7) days or such other period as SAHA may authorize or require.

11.14.2.1.1 Upon receipt of a notice of termination issued from SAHA, the Contractor shall immediately cease all activities under any contract resulting from this IFB, unless expressly directed otherwise by SAHA in the notice of termination.

11.14.2.1.2 SAHA may terminate any contract resulting from this IFB in whole or in part, if funding is reduced, or is not obtained and continued at levels sufficient to allow for the expenditure.

11.14.3 Termination for Convenience: In the sole discretion of the Contracting Officer, SAHA may terminate any and all contracts resulting from this IFB in whole or part upon thirty days prior notice to the Contractor when it is determined to be in the best interest of SAHA.

11.14.4 The rights and remedies of SAHA provided under this section are not exclusive and are in addition to any other rights and remedies provided by law or under any contract.

11.14.5 In the event the resulting contract from this IFB is terminated for any reason, or upon its expiration, SAHA shall retain ownership of all work products including deliverables, source and object code, microcode, software licenses, and documentation in whatever form that may exist. In addition to any other provision, the Contractor shall transfer title and deliver to SAHA any partially completed work products, deliverables, source and object code, or documentation that the Contractor has produced or acquired in the performance of any resulting contract.

11.15 Examination and Retention of Contractor's Records: SAHA, HUD, or Comptroller General of the United States, or any of their duly authorized representatives shall, until three years after final payment under all contracts executed as a result of this IFB, have access to and the right to examine any of the Contractor's directly pertinent books, documents, papers, or other records involving transactions related to this contract for the purpose of making audits, examinations, excerpts and transcriptions.

11.16 Inter-local Participation

11.16.1 SAHA may from time to time enter into Inter-local Cooperation Purchasing Agreements with other governmental entities or governmental cooperatives (hereafter collectively referred to as "Entity" or "Entities") to enhance SAHA's purchasing power. At SAHA's sole discretion and option, SAHA may inform other Entities that they may acquire items listed in this IFB. Such acquisition(s) shall be at the prices stated herein, and shall be subject to Contractor's acceptance.

11.16.2 In no event shall SAHA be considered a dealer, remarketer, agent or other representative of Contractor or Entity. Further, SAHA shall not be considered and is not an agent; partner or representative of the Entity making purchases hereunder, and shall not be obligated or liable for any such order.

11.16.3 Purchase orders shall be submitted to Contractor by the individual Entity.

11.16.4 SAHA shall not be liable or responsible for any obligation, including but not limited to, payment and for any item or service ordered by an Entity, other than SAHA.

11.17 Right to data and Patent Rights: In addition to other ownership & use rights SAHA shall have exclusive ownership of all, proprietary interest in, and the right to full and exclusive possession of all information, materials, documents, software, and all electronic data discovered or produced by Contractor and/or subcontractor(s) pursuant to the terms of any resulting contract, including but not limited to, reports, memoranda or letters concerning the research and reporting tasks of any resulting contract. Both parties agree to comply with HUD Bulletin 909-23, which is the Notice of Assistance Regarding Patent and Copyright Infringement.

11.18 Lobbying Certification: By proposing to do business with SAHA or by doing business with SAHA, each Bidder certifies the following:

11.18.1 No Federal appropriated funds have been paid or will be paid, by or on behalf of the Bidder, to any person for influencing or attempting to influence an officer or employee of Congress, or an employee of a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into any cooperative agreement, and the extension, continuation, renewal, amendment or modification of any Federal contract, grant, loan or cooperative agreement.

11.18.2 If any funds other than Federally appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form "Disclosure Form to Report Lobbying", in accordance with its instructions.

11.18.3 The successful Bidder shall require that the language of this certification be included in the award documents for all sub-awards at all tiers, (including but not limited to subcontractors, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

11.18.4 This clause is a material representation of fact upon which reliance will be placed when the award is made or a contract is entered into. The signing of a contract or acceptance of award certifies compliance with this certification, which is a prerequisite for making or entering into a contract, which is imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certifications shall be subject to civil penalty of not less than \$10,000.00 and not more than \$100,000.00 for each such failure.

11.19 Applicable Statutes, Regulations & Orders: Contractors shall comply with all statutes, rules, regulations, executive orders affecting procurements by Housing Authorities including but not limited to:

- 11.19.1 Executive Order 11246
- 11.19.2 Executive Order 11063
- 11.19.3 Copeland “Anti-Kickback” Act (18 USC 874)
- 11.19.4 Davis Bacon Act (40 USC 276a-276a-7)
- 11.19.5 Clean Air & Water Acts (42 USC 1857(h); 33 USC 1368)
- 11.19.6 Contract Work Hours & Safety Standards Act (40 USC 327-330)
- 11.19.7 Energy Policy & Conservation Act (PL 94-163, 89 STAT 871)
- 11.19.8 Civil Rights Act of 1964, Title VI (PL 88-352)
- 11.19.9 Civil Rights Act of 1968, Title VIII (PL 90-284 Fair Housing Act)
- 11.19.10 Age Discrimination Act of 1975
- 11.19.11 Anti-Drug Abuse Act of 1988 (42 USC 11901 et. Seq.)
- 11.19.12 HUD Information Bulletin 909-23
- 11.19.13 Immigration Reform & Control Act of 1986
- 11.19.14 Fair Labor Standards Act (29 USC 201, et. Seq.)

11.21 Additional Information: Each provision of law and each clause, which is required by law to be inserted in this IFB or any contract, shall be deemed to have been inserted herein, and this IFB and any resulting contract shall be read and enforced as though such provision or clause had been physically inserted herein. If, through mistake or otherwise, any such provision is not inserted or is inserted incorrectly, this agreement shall forthwith be physically amended to make such insertion or correction upon the application of either party. The fore-mentioned statutes, regulations and executive orders are not intended as an indication that such statute, regulation or executive order is necessary applicable nor is an omission of such statute, regulation or executive order intended to indicate that it is not applicable.

11.22 Conflicting Conditions: In the event there is a conflict between the documents comprising this IFB and any resulting contracts, the following order of precedence shall govern: (1) the more restrictive terms of either: any and all attached HUD forms and the term/conditions in the body of any resulting contract; (2) the IFB; and (3) Contractor’s Response. In the event that a conflict exists between any state statute or federal law the most restrictive terms shall apply.

Continues on next page.

- 11.23 Contract Form:** SAHA will not execute a contract on the successful Bidder's form. Contracts will only be executed on SAHA's form. By submitting a proposal, the successful Bidder agrees to this condition. However, SAHA will consider any contract clauses that the Bidder wishes to include therein, but the failure of SAHA to include such clauses does not give the successful Bidder the right to refuse to execute SAHA's contract form. It is the responsibility of each prospective Bidder to notify SAHA, in writing, with the bid submittal of any contract clauses that he/she is not willing to include in the final executed contract. SAHA will consider such clauses and determine whether or not to amend the Contract.
- 11.24 Force Majeure:** Neither SAHA nor Contractor shall be held responsible for delays or default caused by fire, flood, riot, acts of God or war where such cause was beyond, respectively, SAHA or Contractor's reasonable control. Contractor shall make all reasonable efforts to remove or eliminate such a cause of delay or default and shall, upon the cessation of the cause, diligently pursue performance of its obligations under this Agreement.
- 11.25 Non-Boycott of Israel:** Texas prohibits a governmental entity from doing business with any vendor for goods or services unless that vendor verifies in the contract that "they i) do not boycott Israel and ii) will not boycott Israel during the term of the contract".
- 11.26 TX Gov. Code 2252.152:** Prohibits a government entity from awarding a contract to a company identified as Iran, Sudan, or a Foreign Terrorist Organization as identified on a list maintained by the Texas Comptroller of Public Accounts.
- 11.27 Other Products and Services:** Should the awarded Vendor either now or in the future offer or provide other related products or services SAHA reserves the right to obtain a quote for those products or services from the Vendor and if SAHA deems the fees and the product or service fair and reasonable and of substantial benefit to SAHA the product or service may be purchased under the terms of this solicitation and its subsequent contract as though the product or service was included in the solicitation and contract, or SAHA may choose to procure through other methods.

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ATTACHMENT A

Specifications, Drawings, and Hazardous Materials Survey Report

Note: The Agency has submitted to TDSHS an identical request for the Villa Tranchese project as was approved for the Fair Avenue Apts. Project (copy follows) and is expected to be received shortly. If received prior to bid opening it will be made available by addendum otherwise it will be provided to the awarded vendor prior to start of construction.



October 29, 2018

Mr. Ronald M. Bishop, MPH, CIH
Individual Asbestos Consultant
AEHS, Inc.
4402 Centergate
San Antonio, TX 78217

RE: Fair Avenue Apartments – Variance Request

Dear Mr. Bishop:

The Texas Department of State Health Services (DSHS) has received your request for variance dated August 22, 2018, regarding the proposed use of shaving cream and PVC pipe cylinders to drill holes into textured drywall and joint compound with no containment in an asbestos abatement project at the Fair Avenue Apartments located at 1215 Fair Avenue, San Antonio, TX 78223. The variance request was submitted to DSHS in compliance with the Texas Asbestos Health Protection Rules (TAHPR), Section 295.60(a)(2), which authorizes DSHS to approve work practices that vary from the requirements of TAHPR, including alternative control practices such as dry removal or no negative air, as long as they are certified as equally protective of public health by a Certified Industrial Hygienist (CIH) or a licensed Professional Engineer.

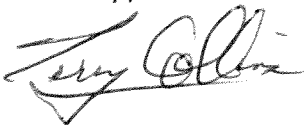
According to the proposed scope of work for the installation of the new fire alarm system and associated hardware submitted with your variance request for this project, holes will be drilled through a section of PVC pipe cylinder filled with shaving cream and into the asbestos-containing textured drywall and joint compound. The asbestos-containing building material will be caught in the shaving cream and be disposed of after every drill hole. This project specification has also been reviewed and certified by you, Mr. Ronald M. Bishop, MPH, CIH as being equally protective of public health.

After careful review of the proposed project scope of work, including the asbestos exposure assessment, the DSHS approves your request for variance from the TAHPR requirement for no negative air during removal, as long as the following conditions are met:

- The project notification submitted to DSHS must include the alternate method described in the proposed scope of work.
- The proposed scope of work for drilling through PVC cylinders packed with shaving cream to catch and hold asbestos-containing drywall texture and joint compound before the asbestos fibers can become airborne must be strictly followed.
- A complete specification for the asbestos abatement work must be on-site during all phases of the project.
- Asbestos-containing waste material (ACWM) must be kept inside the PVC cylinder and remain imbedded in the shaving cream after drilling of the hole and the drill bit shall be removed slowly out of the shaving cream and immediately wet wiped as to minimize any asbestos fiber release to the outside air. The PVC cylinder with ACWM and the contaminated wet wipe(s) must be immediately collected and bagged after every single use and then disposed of properly in accordance with the TAHPR.
- The project scope of work is limited to the Fair Avenue Apartments located at 1215 Fair Avenue, San Antonio, TX 78223.

DSHS believes that close adherence to these provisions, in conjunction with all other requirements of the TAHPR, will reduce the risk of asbestos exposure for both the workers and the public. If you have any questions or need additional information you may contact us by electronic mail at: asbestoshelp@dshs.texas.gov or by telephone at 512-834-6787.

Sincerely,



Terry W. Collins, Asbestos Group Manager
Surveillance Section, Environmental Unit
Consumer Protection Division
Texas Department of State Health Services



Annabelle R. Dillard, Manager
Environmental Hazards Unit, PSQA Section
Consumer Protection Division
Texas Department of State Health Services

Ronald M. Bishop
October 29, 2018
Page 3

Enclosures:

- Variance Request Letter from Ronald M. Bishop, MPH, CIH, dated August 22, 2018
- Proposed scope of work for drilling through textured drywall and joint compound without containment for the installation of a new fire alarm system and associated hardware
- Negative Exposure Assessment (Asbestos Exposure Assessment)

Jon Niermann, *Chairman*
Emily Lindley, *Commissioner*
Toby Baker, *Executive Director*



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

October 9, 2018

Mr. Ken Ofunrein, Inspection Branch Manager
Asbestos Program
Texas Department of State Health Services
P.O. Box 149347
Austin, Texas 78714-9347

Subject: Referral of Certain Asbestos-Related Complaints

Dear Mr. Ofunrein:

The Texas Commission on Environmental Quality (TCEQ) has reviewed the Memorandum of Understanding (MOU) between TCEQ and the Texas Department of State Health Services (DSHS) in Title 30 Texas Administrative Code (TAC) Chapter §7.122. DSHS has jurisdictional authority to regulate and has primary responsibility for emissions related to asbestos demolition and renovation activities per 40 Code of Federal Regulations (CFR) Part 61, Subpart M, including 40 CFR §61.150, which establishes standards for management and disposal of asbestos containing waste. DSHS's regulations require building owners and their agents to properly manage and dispose of asbestos-containing waste material (*see* 25 TAC §§295.34(b), 295.58(l)) and require asbestos transporters to obtain a license, comply with labeling requirements for asbestos-containing waste material, and ensure that asbestos-containing waste materials are properly disposed of (25 TAC §295.56). As stated in the MOU, TCEQ's role in the current asbestos regulatory framework is derived from 40 CFR §61.154 and applies to the owner or operator of active solid waste disposal sites (landfills), not the generator or transporter. Therefore, we recommend that complaints alleging unauthorized disposal against generators or transporters of asbestos-containing waste material be investigated by DSHS.

Please see the enclosed attachment regarding the referral of two complaints received by the TCEQ Region 4 Dallas-Fort Worth Office to DSHS for further evaluation.

If there are any clarifications needed regarding the jurisdictional understanding or referral of these complaints, please contact TCEQ Office of Legal Services, Litigation Division at 512-239-3400 for further discussion.

Sincerely,

A handwritten signature in cursive script, appearing to read "Erin Gorman".

Erin Gorman
Waste Section Manager
DFW Regional Office

Enclosure: Complaint Referrals

cc: Mr. James A. Zoretic, MD, MPH, Regional Director; Texas Department of State Health Services;
1301 South Bowen Road, Suite 200; Arlington, Texas 76013

TCEQ DFW REGION COMPLAINT REFERRALS TO DSHS REGARDING ASBESTOS

The TCEQ Region 4 Dallas-Fort Worth Office recently received two complaints from DSHS alleging the unauthorized disposal of regulated asbestos-containing material (RACM) by a generator and/or transporter. The TCEQ formally requests these two complaints be referred to DSHS to investigate whether the building owner has complied with the regulations relating to on-site asbestos waste management and transportation to the waste disposal site. The TCEQ could be notified for a potential investigation when the complaint alleges mismanagement of RACM once it has been received at the waste disposal site.

Complaint 1:

Date Received: 05/02/2018

Complainant: Mr. Ted Wyman, DSHS Inspector

Incident Description: The complainant alleges that the property owner is mismanaging and disposing of friable asbestos waste at an unauthorized facility.

Location: Super Value Inn

Address: 111 Interstate 20 Frontage Road, Weatherford, Texas 76087

DSHS was already conducting a separate investigation related to this site but TCEQ was asked to investigate the unauthorized disposal allegation.

Complaint 2:

Date Received: 08/16/2018

Complainant: Mr. Ted Wyman, DSHS Inspector

Incident Description: The complainant alleges that the property owner is mismanaging and disposing of friable asbestos waste at an unauthorized facility.

Location: Medical and Dental Offices

Address: 3232 Broadway Boulevard, Garland, Texas 75043



AEHS, Inc.

An Environmental, Health, and Safety Consulting Firm

4402 Center Gate, San Antonio, Texas 78217 (210) 656-9300 fax (210) 656-8499

August 22, 2018

Mr. Todd Wingler, PE
Environmental and Sanitation Licensing Group MC 2835
Texas Department of State Health Services
P. O. Box 149347
Austin, Texas 78714-9347

Dear Mr. Wingler:

In concert with our previous telephone conversations, this letter is requesting a variance from the Texas Asbestos Health Protection Rules – TAHPR §295.60. OPERATIONS: ABATEMENT PRACTICES AND PROCEDURES FOR PUBLIC BUILDINGS. This variance request is in accordance with TAHPR §295.60(a)(2). The control methods are at least as protective of the public health (workers, building occupants, and the environment).

An Asbestos Exposure Assessment for simulating the installation of a new fire alarm system including the attachment of pipe run brackets, smoke alarms, smoke alarm strobes, etc., was conducted. This involved the monitoring during 50 simulated attachments which included the disturbance of asbestos containing textured drywall at the Fair Avenue Apartments. The apartment chosen was typical, included asbestos containing texture, and was unoccupied. The specific methodology to simulate the proposed variance is at Enclosure 1. Additionally, the monitoring results are included with Enclosure 1.

Based on the results of the Asbestos Exposure Assessment, a Negative Exposure Assessment was prepared and is included as Enclosure 2.

This information is provided by Ronald M. Bishop, MPH, CIH. Ron is a Certified Industrial Hygienist, Certified Safety Executive, Certified Environmental and Safety Compliance Officer as well as a Texas Department of State Health Services (TDSHS) Mold Assessment Consultant, Lead Risk Assessor and Project Designer, and Asbestos Consultant as well as a Green Consultant. Ron Bishop is also a TDSHS Lead, Asbestos, and Mold instructor for AEHS, Inc., which is a TDSHS certified Training Provider in the aforementioned disciplines.

The results of the air monitoring indicated that all sample results were at least a magnitude below the clearance level for asbestos abatement and therefore the general public could occupy the area.

If you have any questions or desire additional information, please contact Ron Bishop at 210 656-9300.

Sincerely,



Ronald M. Bishop, MPH, CIH

ABIH 814

TDSHS No. 105492

Asbestos Exposure Assessment

- a. Installed critical barriers (2 layers of 6 mil thick poly) covering all openings to include all supply and return diffusers and the exterior door.
- b. The room was set up to be placed under negative pressure of at least -0.02 wc using a negative air machine.
- c. A three stage DECON was erected IAW TAHPR.
- d. The simulation was conducted by a TDSHS licensed abatement contractor using licensed supervisor(s) and registered workers. All personnel were current in their respirator fit-testing, medical evaluation, and training. The negative air machine was turned off during the simulation to represent actual conditions.
- e. The PPE included disposable coveralls, half facepiece respirators with P100 filters, and nitrile gloves.
- f. Three (3) inch in diameter cylinders one (1) inch thick were used to surround the attachment location. The cylinders were made from PVC pipe.
- g. The cylinders were placed over the location where the drilling disturbance was to occur and filled with a foamy shaving cream.
- h. After the drilling occurred, the cylinder was removed and the shaving cream wiped with a disposable rag from the wall and cylinder. The shaving cream was disposed of into a properly labelled asbestos waste container for disposal into a regulated disposal facility.
- i. Air monitoring occurred as one personal sample, one area sample, and one sample at the exit to the room.
- j. The samples were analyzed by AEHS, Inc., which is a TDSHS licensed PCM laboratory. All results were less than 0.01 fibers per cubic centimeter and in fact approximately 1 magnitude below the clearance level.
- k. The room was then placed under negative pressure and cleared (clearance) IAW the TAHPR.



DAILY LOG OF ACTIVITY

PROJECT NO: 18-097 DATE: 8/20/2018

LOCATION: 1215 Fair Ave.

CONTRACTOR: TLI SUPERVISOR: Ray M.

ACTIVITY:

0800 - AEHS arrives on site

0815 - Room 210 was occupied so we are drilling holes in 211

0830 - Background pumps are up and running while crew begins to prep.

0845 - Begin paperwork

0900 - Check on prep work.

1000 - Ron Bishop arrives on the job site. / Backgrounds finish running

1015 - crew continues to prep area.

1045 - Pumps have started and work has begun.

1130 - work has finished (all 50 holes have been drilled)

1145 - crew begins cutting out hole where all 50 holes were

1200 - crew has finished cutting hole out of the wall / final clean up

1250 - crew has finished final clean up / AEHS take in pumps for clearance

1300 - All three low-flow pumps have been turned off and collected
Clearance samples have begun

AEHS REPRESENTATIVE SIGNATURE: *Chung Bersley*

CREW SIZE: 3 NEGATIVE AIR UNITS: 1 RESPIRATOR TYPE: half/mouth

ACM TO BE REMOVED: Drilling holes

DECON: MANUALLY CONSTRUCTED POP-UP TRAILER

AIR SAMPLES COLLECTED: INSIDE CONTAINMENT OUTSIDE CONTAINMENT

NEGATIVE AIR MACHINE _____ DECON _____ BAG OUT _____ BACKGROUND _____

PERSONNEL PCM CLEARANCE TEM CLEARANCE _____



DAILY LOG OF ACTIVITY (CONTINUED)

PROJECT NO: 18-097

DATE: 8/20/2018

1430- Samples for clearance are finished and begin reading

1520- Clearance has been achieved and AEHS packs up equipment

1550- AEHS leaves the job site.

1615- AEHS arrives @ offices.

Air Sampling Log

Project Number : 18-097 1215 Fair Ave.

Sampled By : *Chuy Gising*

Project Name : 1215 Fair Ave.

Analyzed By : *Chuy Gising*

Date : 8/20/2018

Sample Number	Type	Sample Location Name / SSN	Pump Number	Flow Rate (L/min)	Time		Total Time (min)	Total Volume (L)	Fiber Count	Results (f/cc)	TWA (f/cc)
					Start	Stop					
1	B	Background	2140	14.0	08:30	10:00	90	1260	135/100	0.005	/
2	B	Background	1881	14.0	08:30	10:00	90	1260	17/100	0.006	/
3	A	Inside Containment	070	2.0	10:45	12:50	125	250	5/100	0.009	/
4	A	Outside Containment	066	2.0	10:45	12:50	125	250	35/100	0.006	/
5	P	Joe Snyder	060	2.0	10:45	12:50	125	250	3/100	0.006	0.002
6	C	Inside Containment	1881	14.0	13:00	14:30	90	1260	16/100	0.006	/
7	C	Outside Containment	2140	14.0	13:00	14:30	90	1260	4/100	0.001	/

Types: A = Area B = Background P = Personnel C = Clearance FB = Field Blank

Comments :

*Note: TWA calculated for actual exposure time which was greater than 480 minutes (8 hours).

*Note: TWA calculated using 8 hours (assume that person had zero exposure for balance of the 8 hours).

*Note: NIOSH Method 7400 used, Estimate LOD: 7 fibers/mm³



AEHS, Inc. 4402 Centergate, San Antonio, Texas 78217

Phone: (210) 656-9300 Fax: (210) 656-8499

TDSHS Asbestos Consulting Agency License # 10-0335 TDSHS Asbestos Laboratory License # 30-0295



Visual/Final Inspection
Asbestos Removal, Renovation, & Demolition

Date: 8/20/2018

Project Number: 18-097

Location: 1215 Fair Ave.

1. Visual

Residual dust on:	Yes	No
Floor	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Walls	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Ceiling	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Ventilation Equipment	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pipes	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Ducts	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Lights	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Other _____	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Record any other problems encountered: _____

AEHS Representative: *Clay Brey*

Owner Representative: _____

Contractor Representative: _____

2. Final Clearance

Air Sampling Date: 8/20/2018 Aggressive Passive _____

Rate: 14.0 Time: 90 Volume: 1200 Analytical Method: PCM

Results: 0.000 f/cc 0.001 f/cc _____ f/cc _____ f/cc _____ f/cc
_____ f/cc _____ f/cc _____ f/cc _____ f/cc _____ f/cc

PCM Clearance Standard: 0.01 f/cc TEM Clearance Standard: 70 Structures/mm²

Date Clearance Standard Met: 8/20/2018

I certify that clearance was achieved

Signature of AEHS Representative: *Clay Brey*

Negative Exposure Assessment

Based on the Asbestos Exposure Assessment, this Negative Exposure Assessment is provided in support of the variance request for installing of a new fire alarm system including the attachment of pipe run brackets, smoke alarms, smoke alarm strobes, etc., was conducted. The results depicted that the procedures were at least as protective of public health as the requirements in Texas Asbestos Health Protection Rules – TAHPR §295.60. OPERATIONS: ABATEMENT PRACTICES AND PROCEDURES FOR PUBLIC BUILDINGS.

1. Procedure:

- a. Install critical barriers (2 layers of 6 mil thick poly) covering all openings to include all supply and return diffusers and the exterior door.
- b. Construct a one stage DECON.
- c. Place a drop cloth of six mil thick poly under the area where the penetrations will occur.
- d. Use three (3) inch in diameter cylinders (PVC pipe) one (1) inch thick to surround the attachment location.
- e. The cylinders will be placed over the location where the drilling disturbance will occur and filled with a foamy shaving cream.
- f. After the drilling occurs, the cylinder will be removed and the shaving cream wiped with a disposable rag from the wall and cylinder. The shaving cream will be disposed of into a properly labelled asbestos waste container for disposal into a regulated disposal facility.
- g. Fold the drop cloth inwardly and place into the properly labelled asbestos waste container.
- h. Wet wipe the critical barriers and place into the properly labelled asbestos waste container.
- i. Wet wipe the DECON.
- j. HEPA Vacuum the Room.

2. Worker Protection and Training.

- a. All workers will be trained in asbestos awareness in accordance with OSHA's 29 CFR 1926.1101. The asbestos awareness training will include: Background, Hazards, PPE, and Task Specific procedures.
- b. Personal Protective Equipment will include disposable coveralls and nitrile gloves.

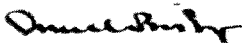
c. All personnel will exit through the single stage DECON by washing all exposed skin after removing of the gloves and coveralls.

3. Occupant Protection.

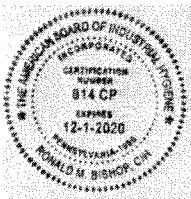
- a. Critical barriers as per procedure.
- b. DECON as per procedure.
- c. Final cleaning as per procedure.
- d. Wet wipe the critical barriers and place into the properly labelled asbestos waste container.
- e. Wet wipe the DECON.
- f. HEPA Vacuum the Room.

4. Environmental Protection.

- a. Critical barriers as per procedure.
- b. DECON as per procedure.
- c. Final cleaning as per procedure.
- d. Fold the drop cloth inwardly and place into the properly labelled asbestos waste container.



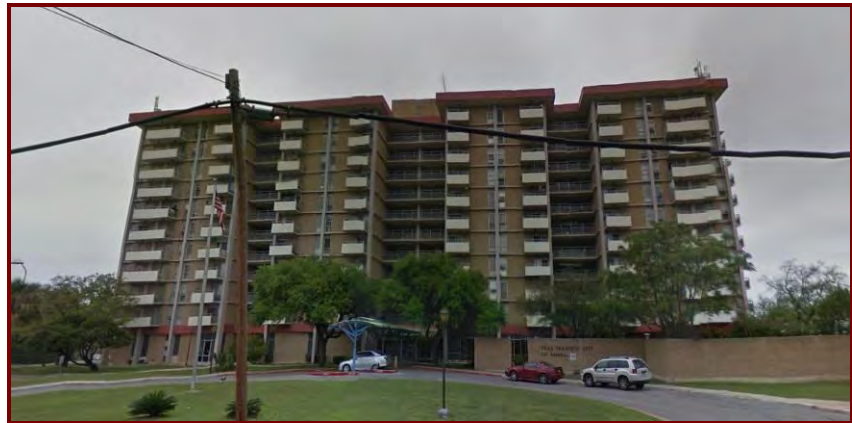
Ronald M. Bishop, MPH, CIH
ABIH 814
TDSHS Asbestos Consultant No. 105492



Limited Asbestos and Lead-Containing Paint Survey Report

**VILLA TRANCHESE APARTMENTS
FIRE PROTECTION IMPROVEMENTS
307 Marshall Street
San Antonio, Texas**

May 16, 2018
Terracon Project No. 90187143



Prepared for:
San Antonio Housing Authority
San Antonio, Texas

Prepared by:
Terracon Consultants, Inc.
San Antonio, Texas

6911 Blanco Road (210) 641-2112
San Antonio, TX 78216 terracon.com

Terracon

Environmental



Facilities



Geotechnical



Materials

May 16, 2018



Mrs. Patti Keller, CTP
San Antonio Housing Authority
818 S. Flores Street
San Antonio, Texas 78204

Telephone: (210) 477-6170
Fax: (210) 477-6167
E-mail: patti_keller@saha.org

Re: Limited Asbestos & Lead-Containing Paint Survey Report
Villa Tranchese Apartments, Fire Protection Improvements
307 Marshall Street
San Antonio, Texas 78212
Terracon Project No. 90187143

Dear Mrs. Keller:

The purpose of this report is to present the results of the limited asbestos and lead-containing paint survey performed on April 4 and April 5, 2018, at the above referenced site in San Antonio, Texas. This survey was conducted in general accordance with our proposal dated March 15, 2018. We understand that this survey was requested to identify and quantify asbestos-containing materials and lead-containing paint/coatings where renovations/installations are planned in the building.

Asbestos-containing HVAC duct mastic, chilled water line insulation, interior caulk, and drywall construction materials were identified in various locations throughout the building. Please refer to the attached report for details.

Terracon appreciates the opportunity to provide this service to San Antonio Housing Authority. If you have any questions regarding this report, please contact the undersigned at (210) 641-2112.

Sincerely,

Terracon Consultants, Inc.

Inspected By:

Warren P. Dean
TDSHS Asbestos Inspector
License No. 60-3403
Lead Risk Assessor
TDSHS Certificate No. 2071063

Inspected By:

Gabriel A. Gonzalez
TDSHS Asbestos Inspector
License No. 60-3052
Lead Risk Assessor
TDSHS Certificate No. 2071064

Reviewed By:

Richard Ian Howes
TDSHS Individual Asbestos
Consultant
License No. 10-5406
Lead Inspector/Project Designer
Certificate No. 2060584/2090034

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APPENDIX A ASBESTOS SURVEY SAMPLE SUMMARY

APPENDIX B CONFIRMED ASBESTOS-CONTAINING MATERIALS

APPENDIX C ASBESTOS LABORATORY ANALYTICAL REPORT

APPENDIX D LEAD CONTAINING PAINT SAMPLE SUMMARY

APPENDIX E LEAD LABORATORY ANALYTICAL REPORT

APPENDIX F LEAD BASED PAINT XRF ANALYTICAL REPORT

APPENDIX G XRF PERFORMANCE CHARACTERISTIC SHEET

APPENDIX H LICENSES AND CERTIFICATIONS

APPENDIX I SAMPLE LOCATION MAPS

**LIMITED ASBESTOS AND
LEAD-CONTAINING PAINT SURVEY REPORT
VILLA TRANCHESE APARTMENTS - FIRE PROTECTION IMPROVEMENTS
307 Marshall Street, San Antonio, Texas
Terracon Project No. 90187143
May 16, 2018**

1.0 INTRODUCTION

Terracon conducted a limited asbestos-containing materials (ACM) survey and lead-containing paint (LCP) sampling of client selected units within the areas of the building scheduled for renovations at the Villa Tranchese Apartments located at 307 Marshall Street in San Antonio, Texas. The survey was conducted on April 4 and April 5, 2018, by Texas Department of State Health Services (TDSHS) licensed and Environmental Protection Agency (EPA) accredited Asbestos Inspectors and certified Lead Risk Assessors in general accordance with our proposal dated March 15, 2018.

Interior building components where renovations/installations are planned were surveyed and homogeneous areas of suspect asbestos-containing materials (ACM) were visually identified and documented. Although reasonable effort was made to survey accessible suspect materials, additional suspect but un-sampled materials could be located in walls, in voids or in other concealed areas. Suspect ACM samples were collected in general accordance with the sampling protocols outlined in Environmental Protection Agency (EPA) regulation 40 CFR 763, The Asbestos Hazard Emergency Response Act (AHERA). Samples were delivered to a National Voluntary Laboratory Accreditation Program (NVLAP) accredited and Texas Department of State Health Services (TDSHS) licensed laboratory for analysis by Polarized Light Microscopy (PLM) protocol.

The lead-containing paint sampling was conducted in general accordance with Texas Environmental Lead Reduction Rules (TELRR) and was intended to identify and assess the lead content of the materials which might be disturbed in the planned renovations/installations activities. An X-ray fluorescence (XRF) type analyzer was used to obtain direct readouts of lead content in coated surfaces associated with the building. XRF values are read and recorded in the field. Where XRF analyses resulted in readings below the standard set by TDSHS, EPA and HUD of 1.0 mg/cm², or exceptionally high concentrations of lead, the sample team randomly selected locations for collection of paint chip samples for laboratory confirmation. Samples of suspect LCP were delivered to an American Industrial Hygiene Association (AIHA) accredited laboratory for analysis utilizing Atomic Absorption Spectrometry (AAS Flame) methodology.

1.1 Project Objective

We understand that this survey was requested to identify and quantify asbestos-containing materials and lead-containing paint/coatings present in the building which may be disturbed by the planned renovations and fire protection installations. The study was primarily focused on wall and ceiling areas where renovations/installations are planned. The Texas Asbestos Health Protection Rules (TAHPR) and EPA regulation 40 CFR 61, Subpart M, The National Emission Standards for Hazardous Air Pollutants (NESHAP) requires that an asbestos survey be performed prior to renovation or demolition activities.

The Texas Department of State Health Services (TDSHS) regulates asbestos-related activities in the State of Texas. The TDSHS Texas Asbestos Health Protection Rules (TAHPR) require that a licensed Asbestos Inspector conduct an asbestos survey which conforms to generally accepted industry standards such as the protocol specified in 40 CFR Part 763.85, commonly referred to as the Asbestos Hazard Emergency Response Act (AHERA) that applies to schools. Other factors are taken into consideration when determining the best method to determine the location, extent and condition of Asbestos-Containing Materials (ACMs) in a non-school building.

EPA regulation 40 CFR 61, Subpart M, National Emission Standards for Hazardous Air Pollutants (NESHAP), prohibits the release of asbestos fibers to the atmosphere during renovation or demolition activities. The asbestos NESHAP, which is enforced by the TDSHS, requires that prior to the commencement of demolition or renovation, that the facility or part of the facility affected be thoroughly inspected for the presence of both Friable (Regulated Asbestos-Containing Building Materials), and Non-Friable (Category I & II Asbestos-Containing Materials). The Occupational Health and Safety Administration (OSHA) has promulgated a worker protection standard for the disturbance of asbestos during renovation and demolition projects.

The Department of Housing and Urban Development (HUD) guidelines consider a lead content equal to or greater than 5,000 parts per million (PPM) to be the level at which paint is considered to be “lead-based” and at which point a potential hazard exists. The Occupational Safety and Health Administration (OSHA) considers paint containing any level of lead above the analytical method detection limit a potential hazard which should be communicated to any employees or contractors who may disturb the materials in the course of their assigned work.

OSHA recognizes that HUD and the EPA find XRF analyzers acceptable for analyzing lead in paint at their clearance level of 1.0 mg/cm². They also recognize that some instruments can measure accurately at substantially lower levels. However, please be aware that while XRF analyzers may be an acceptable method of analysis for meeting HUD/EPA requirements, OSHA's concerns are different from those of HUD and EPA.

OSHA does not consider any method that relies solely on the analysis of bulk materials or surface content of lead (or other toxic material) to be acceptable for safely predicting employee exposure to airborne contaminants. Without air monitoring results or without the benefit of historical or objective data (including air sampling which clearly demonstrates that the employee cannot be exposed above the action level during any process, operation, or activity) the analysis of bulk or surface samples cannot be used to determine employee airborne exposure.

2.0 BUILDING DESCRIPTION

The building is an eleven-story, masonry/brick structure atop a concrete slab-on-grade foundation. The roof consists of a flat built-up membrane system. Interior walls consisted of a mixture of wood components, drywall construction, and concrete masonry unit (CMU) with a variety of painted and textured finishes. Ceilings in the public areas consisted primarily of acoustical tile systems. Ceilings in the units were observed to be adhered acoustical ceiling tile on concrete in most locations with painted and textured drywall construction ceilings in some units and many bathroom areas. The floors in the majority of the units were finished with resilient floor tile. The bathrooms were finished with grouted ceramic tile

3.0 FIELD ACTIVITIES

The Asbestos and Lead Containing Paint survey was conducted by Mr. Warren P. Dean and Mr. Gabriel Gonzalez, TDSHS licensed and EPA accredited Asbestos Inspectors and TDSHS certified Lead Risk Assessors employed by Terracon. Copies of each individual's licenses/certificates are attached as Appendix H. The asbestos survey was conducted in general accordance with the sample collection protocols established in the TAHPR and/or EPA regulation 40 CFR 763, the Asbestos Hazard Emergency Response Act (AHERA). The lead testing was conducted in general accordance with Texas Environmental Lead Reduction Rules (TELRR). A summary of survey activities is provided below.

3.1 Visual Assessment

Our survey activities began with a visual observation of the interior areas where renovations/installations are planned throughout the building to identify homogeneous areas of suspect ACM. A homogeneous area consists of building materials that appear similar throughout in terms of color, texture and date of application. Interior assessment was conducted throughout visually accessible areas of the building. Building materials identified as concrete, glass, wood, masonry, metal or rubber were not considered suspect ACM.

Suspect materials located within wall cavities and behind ceramic tile were not sampled in order to prevent excessive damage to the material. Suspect materials, such as vermiculite fill, mastic or other materials (i.e. overspray texturizers) which were not accessible on the day of the survey should be sampled prior to demolition or renovation activities if the activities will disturb the materials.

Terracon visually assessed interior areas of the building to identify painted/coated surfaces with suspect LCP. Painted/coated surfaces which appear similar throughout in terms of color, texture, substrate and date of application are treated as a homogeneous paint combination for paint chip collection purposes. Painted/coated surfaces were visually assessed for evidence of distress, flaking, chipping and/or peeling. The visual assessment included evaluating the condition of the building, condition of painted surfaces, dust accumulation in interior spaces, and painted components at impact or friction surfaces. The information gathered in the visual assessment was utilized in determining the collection points of LCP samples collected.

The LCP sampling was limited to readily observable and accessible surfaces. It should be noted that suspect lead-containing paint (LCP), other than those identified during the sampling, may exist within the building and/or on the building exterior. Materials which have not been specifically evaluated should be tested prior to disturbance of the material. If suspect LCP is identified during the demolition process, those materials should be assumed LCP until testing can be performed to determine if lead is present in the paint.

3.2 Physical Assessment

A physical assessment of each homogeneous area of suspect ACM was conducted to assess the friability and condition of the materials. A friable material is defined by the EPA as a material which can be crumbled, pulverized or reduced to powder by hand pressure when dry. Friability was assessed by physically touching suspect materials.

A physical assessment of each painted/coated surface was conducted to assess its condition. The painted/coated surfaces were assessed to be in good, fair or poor condition depending on degree of cracking, flaking, chipping and/or peeling.

3.3 Sample Collection

Based on results of the visual observation, bulk samples of suspect ACM were collected in general accordance with AHERA and TAHPA sampling protocols. Random samples of suspect materials were collected in each homogeneous area. The sample team members collected bulk samples using wet methods as applicable to reduce the potential for fiber release. Samples were placed in sealable containers and labeled with unique sample numbers using an indelible marker.

One hundred-eight (108) bulk samples were collected from twenty-seven (27) homogeneous areas of suspect ACM. A summary of suspect ACM samples collected during the survey is included as Appendix A.

Ninety-nine (99) XRF readings were collected along with eighteen (18) calibration readings as part of this study. Where XRF analyses resulted in readings below the standard set by TDSHS, EPA and HUD of 1.0 mg/cm², or exceptionally high concentrations of lead, the sample team randomly selected locations for collection of paint chip samples for laboratory confirmation. Nine (9) chip

samples of suspect paint materials were collected in general accordance with TELRR and HUD Guidelines. Each chip sample was placed in a sealable container and labeled with a unique sample number using an indelible marker. A summary of the suspect lead-containing samples collected during the survey is included as Appendix D.

3.4 Sample Analysis

Bulk suspect asbestos samples were submitted under chain of custody to Moody Labs of Farmers Branch, Texas for analysis by PLM with dispersion staining techniques per EPA's Method for the Determination of Asbestos in Bulk Building Materials (600/R-93-116). The percentage of asbestos, where applicable, was determined by microscopy visual estimation. Moody Labs is accredited under the National Voluntary Laboratory Accreditation Program (NVLAP Accreditation No. 102056-0) and licensed by the TDSHS (License Number 30-0084). Reports of laboratory analysis of all suspect asbestos samples collected and sample chain-of-custody documentation are included in Appendix C.

Bulk samples of the suspect lead-containing paint materials collected during the survey were analyzed by Environmental Hazards Services (EHS), L.L.C., an American Industrial Hygiene Association (AIHA) accredited laboratory utilizing Atomic Absorption Spectrometry (AAS Flame) methodology. Reports of laboratory analysis of the suspect lead-containing paint samples collected and sample chain-of-custody documentation are included in Appendix E.

3.5 LCP Methodology and Analysis

A Heuresis Pb200i XRF instrument was used to determine whether surface coatings contained lead-based paint. The building was evaluated to identify different testing combinations present. The subject building is designated as housing for the elderly and not considered a Child Occupied Facility or Target Housing under HUD Regulations. In the absence of published guidelines for testing commercial buildings, Terracon generally observed HUD Guidelines for testing housing but collected an abbreviated number of sample readings. Per the HUD testing guidelines, individual tests are to be classified as part of a group based on the testing combination (room equivalent, component, and substrate). Substrates are classified as brick, masonry, concrete, drywall, metal, plaster, or wood. A component is defined as an item, such as doors, windows, walls, etc. When using testing combinations, LBP results are classified by summing the individual component test results of positive, negative, or inconclusive.

For more detailed information, including testing location, component, color, and substrate, refer to the XRF testing results contained in Appendix F.

No materials were assumed to be LBP. Any inaccessible areas that contain painted surfaces should be tested when access permits or should be assumed to be positive for LBP.

3.6 LCP Wall and Component Identification System

Wall sides were identified with letters A, B, C and D. Side A is the north side. Sides B, C, and D are identified clockwise, starting from the “3 o’clock” position from Side A as one faces north; thus, Side B is to the right, Side C is across from Side A, and Side D is to the left of Side A.

3.7 XRF Instrumentation

The Heuresis Pb200i XRF instrument (Serial No. 1570; Reference Date: June 15, 2017) was used in the testing for lead based paint for this project. During the inspection, the standard set by TDSHS, EPA and HUD of 1.0 mg/cm² was followed to determine the components that contained LBP.

The calibration of the Heuresis Pb200i XRF instrument was done in accordance with the Performance Characteristic Sheet (PCS). The Heuresis Pb200i XRF instrument was calibrated using the paint film nearest 1.0 mg/cm² in the NIST Standard Reference Material (SRM).

Using protocols provided by HUD and the instrument manufacturer and in accordance with NIST reference standard, calibration checks are performed at least twice daily, once prior to the inspection and once immediately after the inspection and every four hours in-between. If for any reason the Heuresis Pbi200 XRF instrument is not maintaining a consistent calibration reading within the manufacturer’s standards for performance on the calibration sheet supplied by the manufacturer, manufacturer’s recommendations are used to bring the instrument into calibration. If the instrument cannot be brought back into calibration, the instrument will be returned to the manufacturer for repair and/or re-calibration. The PCS is located in Appendix G.

An XRF reading above the standard of 1.0 mg/cm² of lead is considered positive for the presence of lead-based paint; however, while a reading below 1.0 mg/cm² is considered negative for the presence of lead-based paint, disturbance of the material could still create harmful conditions if proper precautions are not taken during activities that disturb these paint combinations

4.0 REGULATORY OVERVIEW

The State of Texas has established the Texas Asbestos Health Protection Rules (TAHPR) which requires any asbestos-related activity to be performed by an individual licensed by the State of Texas, through the TDSHS. An asbestos related activity consists of the disturbance (whether intentional or unintentional), removal, encapsulation, or enclosure of asbestos, including preparations or final clearance, the performance of asbestos surveys, the development of management plans and response actions, asbestos project design, the collection or analysis of asbestos samples, monitoring for airborne asbestos, bidding for a contract for any of these activities, or any other activity required to be licensed under TAHPR.

Abatement must be performed by a State of Texas licensed asbestos abatement contractor in accordance with a project design prepared by a State of Texas licensed asbestos consultant. In addition, third party air monitoring must be conducted during the abatement activities.

The asbestos NESHAP (40 CFR Part 61 Subpart M) regulates asbestos fiber emission and asbestos waste disposal practices. It also requires the identification and classification of existing building materials prior to demolition or renovation activity. Under NESHAP, asbestos containing building materials are classified as either friable, Category I non-friable or Category II non-friable ACM. Friable materials are those that, when dry, may be crumbled, pulverized or reduced to powder by hand pressure. Category I non-friable ACM includes packing, gaskets, resilient floor coverings and asphalt roofing products containing more than 1% asbestos. Category II non-friable ACM are any materials other than Category I materials that contain more than 1% asbestos.

Friable ACM, Category I and II non-friable ACM in poor condition and has become friable or which will be subject to drilling, sanding, grinding, cutting, or abrading and which could be crushed or pulverized during anticipated renovation or demolition activities are considered regulated ACM (RACM). RACM must be removed prior to renovation or demolition activities.

The TAHPR and NESHAP require that written notification be submitted before beginning renovation or demolition projects which include the disturbance of any asbestos-containing material (ACM) in a building or facility, or before the demolition of a building or facility, even when no asbestos is present. This written notification must be provided to the TDSHS at least 10 working days prior to the commencement of asbestos abatement or demolition activities. Removal of RACM must be conducted by a State of Texas licensed asbestos contractor. In addition, third party air monitoring must be performed during the abatement.

The OSHA Asbestos standard for the construction industry (29 CFR 1926.1101) regulates workplace exposure to asbestos. The OSHA standard requires employee exposure to airborne asbestos fibers be maintained below 0.1 asbestos fibers per cubic centimeter of air (0.1 f/cc).

The OSHA standard classifies construction and maintenance activities which could disturb ACM and specifies work practices and precautions which employers must follow when engaging in each class of regulated work. States that administer their own federally approved state OSHA programs may require other precautions.

The State of Texas has established the Texas Environmental Lead Reduction Rules (TELRR) Texas Administrative Code (TAC), Title 25, Part 1, Chapter I, Subchapter 295 to establish the means to control and minimize public exposure to lead by regulating lead-based paint activities in target housing and child-occupied facilities. The TELRR contains procedures and requirements for the accreditation of lead training providers, procedures and requirements for the certification of individuals and firms engaged in lead-based paint activities and standards for performing such activities in target housing and child-occupied facilities. The TELRR requires that all lead-based paint activities in target housing and child-occupied facilities be performed by certified individuals. Regulatory agencies (HUD, TDSHS) have defined LBP as a paint or

other surface coating that contain equal to or greater than $\geq 5,000$ parts per million (ppm) of lead or more than 0.5% of lead by weight for buildings that meet the definition of target housing. The Occupational Safety and Health Administration (OSHA) define LBP as a paint which contains lead, regardless of the concentration.

The OSHA Lead Standard for Construction (29 CFR 1926.62) applies to construction work where an employee may be occupationally exposed to lead. All work related to construction, alteration, or repair (including painting and decorating) is included. The lead-in-construction standard applies to any detectable concentration of lead in paint. OSHA considers paint containing any level of lead above the analytical method detection limit a potential hazard which should be communicated to any employees or contractors who may disturb the materials in the course of their assigned work.

5.0 FINDINGS AND RECOMMENDATIONS

Ten (10) of the homogeneous materials sampled and analyzed as part of this survey were found to contain asbestos.

- Drywall Construction – The multi-colored drywall construction materials with a light orange peel texture utilized as walls, ceilings and furr downs throughout 1st Floor Common Areas (except in 1st Floor Restrooms and Lease Space) were found to contain 2% Chrysotile asbestos. The asbestos-containing drywall construction materials identified were noted to be in a good condition and were assessed as being non-friable. It is estimated that there exists approximately 14,100 square feet of these materials in the above listed areas.
- Drywall Construction – The tan drywall construction materials with a knockdown texture utilized on walls in the 1st Floor Lease Space were found to contain 2% Chrysotile asbestos. The asbestos-containing drywall construction materials identified were noted to be in a good condition and were assessed as being non-friable. It is estimated that there exists approximately 4,400 square feet of these materials in the above listed areas.
- Chilled Water Line Insulation and Mastic - The white/tan insulation and mastic materials utilized on the old thermal insulation materials (TSI) in 1st Floor Mechanical Room (southeast pipes) were found to contain 2% amosite and 5% Chrysotile asbestos. The asbestos-containing insulation and mastic materials identified were noted to be in good condition and were assessed as being non-friable. Approximately 50 linear feet of these materials were observed in the above listed areas, however it is likely additional quantities of the insulation materials are present within chases/wet walls of the building.

- Drywall Construction – The drywall construction materials with tape and float utilized on walls in 1st Floor Mechanical Room were found to contain 5% Chrysotile asbestos. The asbestos-containing drywall construction materials identified were noted to be in a good condition and were assessed as being non-friable. It is estimated that there exists approximately 650 square feet of these materials in the above listed areas
- Drywall Construction – The multi-colored drywall construction materials with a medium orange peel texture utilized on interior demising walls throughout the Lease Units (except perimeter walls) were found to contain 2% Chrysotile asbestos. The asbestos-containing drywall construction materials identified were noted to be in a good condition and were assessed as being non-friable. Due to the scope of the asbestos survey, total quantities of ACM materials located in the building are undetermined.
- Drywall Construction – The multi-colored drywall construction materials with a smooth texture utilized on ceilings of the Restrooms in the Lease Units were found to contain 2% Chrysotile asbestos. The asbestos-containing drywall construction materials identified were noted to be in a good condition and were assessed as being non-friable. Due to the scope of the asbestos survey, total quantities of ACM materials located in the building are undetermined.
- HVAC Duct Mastic – The black mastic materials utilized on ducts associated with the Air Handler Unit (AHU) in the Basement were found to contain 15% Chrysotile asbestos. The asbestos-containing HVAC duct mastic materials identified were noted to be in good condition and were assessed as being non-friable. It is estimated that there exists approximately 75 square feet of these materials in the Basement areas.
- HVAC Duct Mastic – The black mastic materials utilized on duct in the Exterior Mechanical Room were found to contain 15% Chrysotile asbestos. The asbestos-containing HVAC duct mastic materials identified were noted to be in good condition and were assessed as being non-friable. It is estimated that there exists approximately 75 square feet of these materials in the Exterior Mechanical Room.
- Chilled Water Line Insulation and Mastic - The white/tan insulation and mastic materials utilized on TSI in the Exterior Mechanical Room were found to contain 2% amosite and <1% Chrysotile asbestos. The asbestos-containing insulation and mastic materials identified were noted to be in good condition and were assessed as being non-friable. Approximately 60 linear feet of these materials were observed in the Exterior Mechanical Room, however it is likely additional quantities of the insulation materials are present within chase/wet walls of the building.
- Interior Caulk - The gray interior window and door frame caulking material utilized around the door and window frames in the Basement Office was found to contain 2% Chrysotile asbestos. The asbestos-containing caulking materials identified were noted to be in a damaged condition and were assessed as being non-friable. It is estimated that there exists approximately 50 linear feet of these materials associated with the Basement Office door and window frames.

None of the other suspect building materials where renovations/installations are planned in the building that were sampled and analyzed were found to contain asbestos.

It should be noted that suspect materials, other than those identified during the April 4 and April 5, 2018, survey may exist within the building. Should suspect materials other than those which were identified during this survey be uncovered prior to or during the renovation process, those materials should be assumed asbestos-containing until sampling and analysis can confirm or deny their asbestos content.

A summary of the classification, condition and approximate quantity of confirmed ACM are presented in Appendix B. Laboratory analytical reports are included in Appendix C.

It is understood a fire protection system installation project is planned at the facility which would likely disturb select sections of the asbestos-containing drywall construction materials. It is recommended that a plan be developed in concert with the fire control system installer to have the impacted materials removed from their path of construction to facilitate installations. The TDSHS TAHPR require that any removal of asbestos-containing materials associated with the building be conducted by trained and licensed asbestos abatement personnel.

If the Client does not intend to renovate or demolish the building and/or following completion of the planned project, the asbestos-containing materials which will remain in the building should be managed in place. This in-place management should include such operations as repairing any damaged materials, protecting the remaining asbestos-containing materials from further damage, and developing a plan to periodically monitor the condition of the asbestos-containing materials. Notification of the presence of the materials should also be made to residents, employees and outside contractors so that they do not inadvertently disturb the remaining asbestos-containing materials.

According to the TDSHS TAHPR, a removal project involving the removal of more than 160 square feet or 260 linear feet of non-friable asbestos-containing materials would need to be designed by a licensed Individual Asbestos Consultant. Air monitoring by a licensed third-party Air Monitor would be required during the actual removal work regardless of the size of the project. Terracon would be pleased to provide a proposal to provide these services.

It is important to note the TAHPR and NESHAP require that written notification be submitted before beginning renovation or demolition projects which include the disturbance of any asbestos-containing material (ACM) in a building or facility, or before the demolition of a building or facility, even when no asbestos is present. This written notification must be provided to the TDSHS at least 10 working days prior to the commencement of asbestos abatement or demolition activities. These activities must be performed in accordance with the current TDSHS, EPA, and OSHA guidelines.

The XRF readings indicated the paint combinations tested are not considered to be lead-based paint by this testing method. No readings were measured as inconclusive. The possibility exists that LBP coated surfaces may be hidden from sight or in inaccessible locations, or the homogeneous construction areas identified may not be homogeneous.

Eight (8) of the nine (9) paint/coating combinations from which chip samples were collected and analyzed as part of this survey were found to contain lead in concentrations below the detection limit and would be considered by OSHA to present no workforce hazard.

- V-L01 – The tan paint material applied to the walls throughout the 1st Floor Lease Space, Employee Men’s Restroom, Main Office 1, Main Office 3, Main Office 4, Laundry Rooms, Custodial Closets, and select units was found to contain <49 ppm lead. Where observed, this material was found to be in good condition.
- V-L02 – The gray paint material applied to walls and ceilings in the Employee Women’s Restroom, Guest Restroom, and Utility Closet was found to contain <43 ppm lead. Where observed, this material was found to be in good condition.
- V-L03 – The white paint material applied to the walls throughout the 1st Floor (except Lease Space, Employee Restrooms, Guest Restroom, Utility Closet, Main Office 1, Main Office 3, Main Office 4, Laundry Rooms, Custodial Closets), and to ceilings in corridors, select units, and Basement Office was found to contain <42 ppm lead. Where observed, this material was found to be in good condition.
- V-L04 – The green paint material applied to the lower portion of Main Office Hallway walls (north and south), and the columns in the Main Lobby was found to contain <42 ppm lead. Where observed, this material was found to be in good condition.
- V-L06 – The yellow paint material applied to the walls surrounding the 1st Floor elevator shaft was found to contain <47 ppm lead. Where observed, this material was found to be in good condition.
- T-L07 – The purple paint material applied to the accent walls in select units was found to contain <40 ppm lead. Where observed, this material was found to be in good condition.
- T-L08 – The yellow paint material applied to the walls in select units was found to contain <85 ppm lead. Where observed, this material was found to be in good condition.

- T-L09 – The black paint material applied to the Main Office window unit air conditioner protective cages was found to contain <38 ppm lead. Where observed, this material was found to be in good condition.

One (1) of the coatings from which chip samples were collected and analyzed as part of this survey was found to contain lead in a concentration exceeding the detection limit, but less than 5,000 PPM which would render the material “Lead-Containing” and be considered a potential hazard by OSHA:

- T- L05 – The blue paint material applied to the walls in the Exercise Room (east and west) was found to contain 110 ppm lead. Where observed, this material was found to be in good condition. Where observed, this material was found to be in fair condition.

Laboratory analytical reports are included in Appendix D. The XRF testing results are contained in Appendix F.

In areas where the Client does not intend to renovate the building, the lead-based/lead-containing paint materials, which will remain in the building(s), should be managed in place. It is recommended that this in-place management should include such operations as stabilizing or repairing any damaged materials, protecting the remaining lead-based/lead-containing paint materials from further damage, and developing a plan to periodically monitor the condition of the lead-based/lead-containing paint materials. Notification of the presence of the materials should also be made to employees and outside contractors so that they do not inadvertently disturb the remaining lead-based/lead-containing paint materials.

If a project which would disturb the lead-based/lead-containing materials within the building is to be conducted, it is recommended that contracting personnel who may disturb the lead-based/lead-containing paint materials within the facility be made aware of the lead content in the materials so that they may exercise proper OSHA procedures for personnel protection or possibly employ protective procedures when working with the coatings.

Planned renovation/demolition activities impacting those materials determined to contain measurable concentrations of lead will be subject to OSHA regulations (29 CFR 1926.62 – Lead Exposure in Construction). The OSHA regulation defines specific training requirements, engineering controls and working practices for construction personnel subject to this standard. There are also federal and state regulations, which require characterization of demolition debris to determine the proper disposal procedures.

Construction work covered by 29 CFR 1926.62 includes any repair, renovation, or other activities that disturb in-place, lead-containing materials, but does not include routine cleaning and repainting where there is insignificant damage, wear, or corrosion of existing lead-containing coatings or substrates. Employers must assure that no employee will be exposed to lead at concentrations greater than the PEL of 50 micrograms per cubic meter (mg/m³) averaged over an

eight-hour period without adequate protection. The OSHA standard also establishes an action level of 30 mg/m³, which if exceeded, triggers certain requirements, including periodic exposure monitoring and medical monitoring. Terracon recommends personnel air sampling of workers that perform work on surfaces with lead-containing paint. Personnel sampling should be performed in compliance with OSHA regulations. As it is understood a demolition project which would disturb the lead-based/lead-containing materials on the building is to be conducted, it is recommended that contracting personnel who may disturb the lead-based/lead-containing paint materials associated with the building be made aware of the lead content in the materials so that they may exercise proper OSHA procedures for personnel protection or possibly employ protective procedures when working with the coatings.

Compliance with applicable OSHA lead regulations is the responsibility of the contractor performing the work and it is recommended that they be required to communicate potential lead hazards to their workforce and utilize lead-safe work practices such as outlined in the EPA Renovation, Repair, and Painting (RRP) Final Rule (40 CFR 745) or applicable portions of the Structural Steel Painting Council (SSPC) Guidelines. It is further recommended that activities such as flame/torch dismantling, dry sanding and/or dry grinding of any components with lead-containing materials applied should be prohibited as part of any repair, renovation or demolition activity.

It is recommended that any painted metal components which are to be removed from the buildings be segregated from the waste stream and be transferred to a suitable metal recycling facility.

The EPA Resource Conservation and Recovery Act (RCRA) regulations set the limit of leachable lead in lead containing waste at 5.0 milligrams per liter (mg/L). Leachable lead means the amount of lead likely to leach from the waste into the surrounding soil of a landfill. This level is established by an analytical method called the toxicity characteristic leaching procedure (TCLP). Lead-containing waste that equals or exceeds the RCRA limit must be managed in accordance with RCRA regulations. This regulation affects the disposal of demolition or remodel debris containing lead or lead based paint.

6.0 GENERAL COMMENTS

This asbestos survey and lead-containing paint sampling was conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions in the same locale. The results, findings, conclusions and recommendations expressed in this report are based on conditions observed during our survey of the building. The information contained in this report is relevant to the date on which this survey was performed, and should not be relied upon to represent conditions at a later date.

This report has been prepared on behalf of and exclusively for use by the San Antonio Housing Authority for specific application to their project as discussed.

This report is not a bidding document. Contractors or consultants reviewing this report must draw their own conclusions regarding further investigation or remediation deemed necessary. Terracon does not warrant the work of regulatory agencies, laboratories or other third parties supplying information which may have been used in the preparation of this report. No warranty, express or implied is made.

APPENDIX A

ASBESTOS SURVEY SAMPLE SUMMARY

APPENDIX A
ASBESTOS SURVEY SAMPLE SUMMARY
VILLA TRANCHESE APARTMENTS - FIRE PROTECTION IMPROVEMENTS
307 Marshall Street, San Antonio, Texas
Terracon Project No. 90187143

SAMPLE NUMBER	MATERIAL DESCRIPTION	HOMOGENEOUS AREA	SAMPLE LOCATION	LAB RESULTS
V-01	Drywall Construction – Multi-Colored with Light Orange Peel Texture	Utilized as walls, ceilings and furr downs throughout 1 st Floor (except in 1 st Floor Restrooms and Lease Space)	West Hallway at Drinking Fountain – South	No Asbestos Detected
V-02	Drywall Construction – Multi-Colored with Light Orange Peel Texture	Utilized as walls, ceilings and furr downs throughout 1 st Floor (except in 1 st Floor Restrooms and Lease Space)	Break Room – Southwest	No Asbestos Detected
V-03	Drywall Construction – Multi-Colored with Light Orange Peel Texture	Utilized as walls, ceilings and furr downs throughout 1 st Floor (except in 1 st Floor Restrooms and Lease Space)	Exercise Room – Southeast	No Asbestos Detected
V-04	Drywall Construction – Multi-Colored with Light Orange Peel Texture	Utilized as walls, ceilings and furr downs throughout 1 st Floor (except in 1 st Floor Restrooms and Lease Space)	Office #4 Closet – Southeast	No Asbestos Detected
V-05	Drywall Construction – Multi-Colored with Light Orange Peel Texture	Utilized as walls, ceilings and furr downs throughout 1 st Floor (except in 1 st Floor Restrooms and Lease Space)	Restroom Hallway Storage Closet – Northeast	2% Chrysotile
V-06	Drywall Construction – Multi-Colored with Light Orange Peel Texture	Utilized as walls, ceilings and furr downs throughout 1 st Floor (except in 1 st Floor Restrooms and Lease Space)	Kitchen – Northeast	No Asbestos Detected
V-07	Drywall Construction – Multi-Colored with Light Orange Peel Texture	Utilized as walls, ceilings and furr downs throughout 1 st Floor (except in 1 st Floor Restrooms and Lease Space)	Library Ceiling – Northwest	No Asbestos Detected
V-08	Drywall Construction – Tan and Gray with Medium Orange Peel Texture	Utilized on walls and ceilings in 1 st Floor Restrooms	Staff Women's Restroom – Southeast	No Asbestos Detected
V-09	Drywall Construction – Tan and Gray with Medium Orange Peel Texture	Utilized on walls and ceilings in 1 st Floor Restrooms	Staff Women's Restroom – North	No Asbestos Detected

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V-10	Drywall Construction – Tan and Gray with Medium Orange Peel Texture	Utilized on walls and ceilings in 1 st Floor Restrooms	Staff Men’s Restroom – Southeast	No Asbestos Detected
V-11	Drywall Construction – Tan with Knockdown Texture	Utilized on walls in the 1st Floor Lease Space	Lease Space Room #5 – Northwest	2% Chrysotile
V-12	Drywall Construction – Tan with Knockdown Texture	Utilized on walls in the 1st Floor Lease Space	Lease Space Room #3 – Northeast	No Asbestos Detected
V-13	Drywall Construction – Tan with Knockdown Texture	Utilized on walls in the 1st Floor Lease Space	Lease Space Room #7 – Northeast	2% Chrysotile
V-14	Suspended Acoustical Ceiling Tile – 2’ x 2’, White with Heavy Texture	Utilized as ceiling in the 1 st Floor Lease Space	Lease Space Room #5 – Central	No Asbestos Detected
V-15	Suspended Acoustical Ceiling Tile – 2’ x 2’, White with Heavy Texture	Utilized as ceiling in the 1 st Floor Lease Space	Lease Space Lobby – Northwest	No Asbestos Detected
V-16	Suspended Acoustical Ceiling Tile – 2’ x 2’, White with Heavy Texture	Utilized as ceiling in the 1 st Floor Lease Space	Lease Space Room #7 – Southeast	No Asbestos Detected
V-17	Chilled Water Line Insulation and Mastic – off-white with white Mastic	Utilized on new TSI in 1 st Floor Mechanical Room	1 st Floor Mechanical Room – South	No Asbestos Detected
V-18	Chilled Water Line Insulation and Mastic – off-white with white Mastic	Utilized on new TSI in 1 st Floor Mechanical Room	1 st Floor Mechanical Room – South	No Asbestos Detected

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SAMPLE NUMBER	MATERIAL DESCRIPTION	HOMOGENEOUS AREA	SAMPLE LOCATION	LAB RESULTS
V-19	Chilled Water Line Insulation and Mastic – off-white with white Mastic	Utilized on new TSI in 1 st Floor Mechanical Room	1 st Floor Mechanical Room – South	No Asbestos Detected
V-20	Chilled Water Line Insulation and Mastic – Tan with white Mastic	Utilized on old TSI in 1 st Floor Mechanical Room (southeast pipes)	1 st Floor Mechanical Room – Southeast Pipe (Top)	2% Amosite 5% Chrysotile
V-21	Chilled Water Line Insulation and Mastic – Tan with white Mastic	Utilized on old TSI in 1 st Floor Mechanical Room (southeast pipes)	1 st Floor Mechanical Room – Southeast Pipe (Middle)	5% Chrysotile
V-22	Chilled Water Line Insulation and Mastic – Tan with white Mastic	Utilized on old TSI in 1 st Floor Mechanical Room (southeast pipes)	1 st Floor Mechanical Room – Southeast Pipe (Bottom)	5% Chrysotile
V-23	Drywall Construction – Tape and Float Only	Utilized on walls in 1 st Floor Mechanical Room	1 st Floor Mechanical Room – Southwest	5% Chrysotile
V-24	Drywall Construction – Tape and Float Only	Utilized on walls in 1 st Floor Mechanical Room	1 st Floor Mechanical Room – Southeast	5% Chrysotile
V-25	Drywall Construction – Tape and Float Only	Utilized on walls in 1 st Floor Mechanical Room	1 st Floor Mechanical Room – Northeast	No Asbestos Detected
V-26	Plaster – Yellow with Bumpy Texture	Utilized on perimeter walls around Elevator Shaft	Elevator Area North Entry – South Wall	No Asbestos Detected
V-27	Plaster – Yellow with Bumpy Texture	Utilized on perimeter walls around Elevator Shaft	Elevator Area North Entry – East Wall	No Asbestos Detected
V-28	Plaster – Yellow with Bumpy Texture	Utilized on perimeter walls around Elevator Shaft	Elevator Area North Entry – North Wall	No Asbestos Detected
V-29	Duct Mastic – White	Utilized on flex duct to Supply Vents above drop ceiling	Exercise Room – West	No Asbestos Detected
V-30	Duct Mastic – White	Utilized on flex duct to Supply Vents above drop ceiling	1 st Floor South Hallway – Central	No Asbestos Detected
V-31	Duct Mastic – White	Utilized on flex duct to Supply Vents above drop ceiling	1 st Floor West Hallway – Central	No Asbestos Detected

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SAMPLE NUMBER	MATERIAL DESCRIPTION	HOMOGENEOUS AREA	SAMPLE LOCATION	LAB RESULTS
V-32	Concrete Masonry Unit (CMU) Texture – Multi-Colored	Utilized on perimeter walls throughout Units	Unit 106 Living Room – Northwest	No Asbestos Detected
V-33	Concrete Masonry Unit (CMU) Texture – Multi-Colored	Utilized on perimeter walls throughout Units	Unit 214 Kitchen – Southwest	No Asbestos Detected
V-34	Concrete Masonry Unit (CMU) Texture – Multi-Colored	Utilized on perimeter walls throughout Units	Unit 312 Kitchen – Southeast	No Asbestos Detected
V-35	Concrete Masonry Unit (CMU) Texture – Multi-Colored	Utilized on perimeter walls throughout Units	Unit 412 Kitchen – Southeast	No Asbestos Detected
V-36	Concrete Masonry Unit (CMU) Texture – Multi-Colored	Utilized on perimeter walls throughout Units	Unit 504 Kitchen – South	No Asbestos Detected
V-37	Concrete Masonry Unit (CMU) Texture – Multi-Colored	Utilized on perimeter walls throughout Units	Unit 613 Kitchen – Northwest	No Asbestos Detected
V-38	Concrete Masonry Unit (CMU) Texture – Multi-Colored	Utilized on perimeter walls throughout Units	Unit 710 Kitchen – Southeast	No Asbestos Detected
V-39	Concrete Masonry Unit (CMU) Texture – Multi-Colored	Utilized on perimeter walls throughout Units	Unit 807 Kitchen – Northeast	No Asbestos Detected
V-40	Concrete Masonry Unit (CMU) Texture – Multi-Colored	Utilized on perimeter walls throughout Units	Unit 901 Living Room – Northwest	No Asbestos Detected
V-41	Concrete Masonry Unit (CMU) Texture – Multi-Colored	Utilized on perimeter walls throughout Units	Unit 1010 Kitchen – Southwest	No Asbestos Detected
V-42	Concrete Masonry Unit (CMU) Texture – Multi-Colored	Utilized on perimeter walls throughout Units	Unit 1110 Kitchen – Southwest	No Asbestos Detected
V-43	Drywall Construction – Multi-Colored with Medium Orange Peel Texture	Utilized on walls in Units (except perimeter walls)	Unit 106 Hallway-Northwest	No Asbestos Detected

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SAMPLE NUMBER	MATERIAL DESCRIPTION	HOMOGENEOUS AREA	SAMPLE LOCATION	LAB RESULTS
V-44	Drywall Construction – Multi-Colored with Medium Orange Peel Texture	Utilized on walls in Units (except perimeter walls)	Unit 214 Kitchen – Southwest	2% Chrysotile
V-45	Drywall Construction – Multi-Colored with Medium Orange Peel Texture	Utilized on walls in Units (except perimeter walls)	Unit 312 Kitchen – Southeast	2% Chrysotile
V-46	Drywall Construction – Multi-Colored with Medium Orange Peel Texture	Utilized on walls in Units (except perimeter walls)	Unit 412 Kitchen – Southeast	2% Chrysotile
V-47	Drywall Construction – Multi-Colored with Medium Orange Peel Texture	Utilized on walls in Units (except perimeter walls)	Unit 504 Living Room Closet – Northeast	2% Chrysotile
V-48	Drywall Construction – Multi-Colored with Medium Orange Peel Texture	Utilized on walls in Units (except perimeter walls)	Unit 613 Living Room Closet – Southwest	2% Chrysotile
V-49	Drywall Construction – Multi-Colored with Medium Orange Peel Texture	Utilized on walls in Units (except perimeter walls)	Unit 710 Kitchen – Southwest	2% Chrysotile
V-50	Drywall Construction – Multi-Colored with Medium Orange Peel Texture	Utilized on walls in Units (except perimeter walls)	Unit 807 Living Room Closet – Southeast	2% Chrysotile
V-51	Drywall Construction – Multi-Colored with Medium Orange Peel Texture	Utilized on walls in Units (except perimeter walls)	Unit 901 Kitchen – Southeast	2% Chrysotile
V-52	Drywall Construction – Multi-Colored with Medium Orange Peel Texture	Utilized on walls in Units (except perimeter walls)	Unit 1010 Kitchen – Southwest	2% Chrysotile
V-53	Drywall Construction – Multi-Colored with Medium Orange Peel Texture	Utilized on walls in Units (except perimeter walls)	Unit 1110 Kitchen – Southwest	2% Chrysotile

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SAMPLE NUMBER	MATERIAL DESCRIPTION	HOMOGENEOUS AREA	SAMPLE LOCATION	LAB RESULTS
V-54	Drywall Construction – Multi-Colored with Smooth Texture	Utilized on ceilings of Restrooms in Units	Unit 214 Restroom Ceiling – Northeast	2% Chrysotile
V-55	Drywall Construction – Multi-Colored with Smooth Texture	Utilized on ceilings of Restrooms in Units	Unit 312 Restroom Ceiling – Northwest	2% Chrysotile
V-56	Drywall Construction – Multi-Colored with Smooth Texture	Utilized on ceilings of Restrooms in Units	Unit 412 Restroom Ceiling – Northwest	2% Chrysotile
V-57	Drywall Construction – Multi-Colored with Smooth Texture	Utilized on ceilings of Restrooms in Units	Unit 504 Restroom Ceiling – Northwest	2% Chrysotile
V-58	Drywall Construction – Multi-Colored with Smooth Texture	Utilized on ceilings of Restrooms in Units	Unit 613 Restroom Ceiling – Southeast	2% Chrysotile
V-59	Drywall Construction – Multi-Colored with Smooth Texture	Utilized on ceilings of Restrooms in Units	Unit 710 Restroom Ceiling – Northeast	No Asbestos Detected
V-60	Drywall Construction – Multi-Colored with Smooth Texture	Utilized on ceilings of Restrooms in Units	Unit 807 Restroom Ceiling – Southwest	2% Chrysotile
V-61	Drywall Construction – Multi-Colored with Smooth Texture	Utilized on ceilings of Restrooms in Units	Unit 901 Restroom Ceiling – Southwest	2% Chrysotile
V-62	Drywall Construction – Multi-Colored with Smooth Texture	Utilized on ceilings of Restrooms in Units	Unit 1010 Restroom Ceiling – Northeast	2% Chrysotile
V-63	Drywall Construction – Multi-Colored with Smooth Texture	Utilized on ceilings of Restrooms in Units	Unit 1110 Restroom Ceiling – Northeast	2% Chrysotile
V-64	Drywall Construction – White with Popcorn Texture	Utilized on ceilings throughout Unit 106	Unit 106 Living Room – Southwest	No Asbestos Detected
V-65	Drywall Construction – White with Popcorn Texture	Utilized on ceilings throughout Unit 106	Unit 106 Bedroom #2 – Southwest	No Asbestos Detected

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ASBESTOS SURVEY SAMPLE SUMMARY
VILLA TRANCHESE APARTMENTS - FIRE PROTECTION IMPROVEMENTS
307 Marshall Street, San Antonio, Texas
Terracon Project No. 90187143

SAMPLE NUMBER	MATERIAL DESCRIPTION	HOMOGENEOUS AREA	SAMPLE LOCATION	LAB RESULTS
V-66	Drywall Construction – White with Popcorn Texture	Utilized on ceilings throughout Unit 106	Unit 106 Bedroom #1 – Northwest	No Asbestos Detected
V-67	Acoustic Ceiling Tile – 1' x 1', White with Pinholes and Brown Mastic	Utilized on majority of ceiling areas throughout Units (except Unit 106)	Unit 613 Living Room – Northwest	No Asbestos Detected
V-68	Acoustic Ceiling Tile – 1' x 1', White with Pinholes and Brown Mastic	Utilized on majority of ceiling areas throughout Units (except Unit 106)	Unit 807 Living Room – Northeast	No Asbestos Detected
V-69	Acoustic Ceiling Tile – 1' x 1', White with Pinholes and Brown Mastic	Utilized on majority of ceiling areas throughout Units (except Unit 106)	Unit 901 Living Room – Northeast	No Asbestos Detected
V-70	CMU Texture – Tan	Utilized on walls throughout Laundry Rooms and Custodial Closets on Floors 2-9	11 th Floor Laundry Room – Northeast	No Asbestos Detected
V-71	CMU Texture – Tan	Utilized on walls throughout Laundry Rooms and Custodial Closets on Floors 2-9	7 th Floor Laundry Room – Northeast	No Asbestos Detected
V-72	CMU Texture – Tan	Utilized on walls throughout Laundry Rooms and Custodial Closets on Floors 2-9	3 rd Floor Laundry Room – Northeast	No Asbestos Detected
V-73	Spray-Applied Texture – Tan with Medium Texture	Utilized on ceilings in Laundry Rooms and Custodial Closets on Floors 2-9	11 th Floor Laundry Room – North Column	No Asbestos Detected
V-74	Spray-Applied Texture – Tan with Medium Texture	Utilized on ceilings in Laundry Rooms and Custodial Closets on Floors 2-9	7 th Floor Laundry Room – North Column	No Asbestos Detected
V-75	Spray-Applied Texture – Tan with Medium Texture	Utilized on ceilings in Laundry Rooms and Custodial Closets on Floors 2-9	3 rd Floor Laundry Room – North Column	No Asbestos Detected
V-76	Suspended Acoustical Ceiling Tile – 2' x 2', White with Fissures and Pinholes	Utilized on ceiling in Basement Office	Basement Office – North	No Asbestos Detected
V-77	Suspended Acoustical Ceiling Tile – 2' x 2', White with Fissures and Pinholes	Utilized on ceiling in Basement Office	Basement Office – Central	No Asbestos Detected

APPENDIX A
ASBESTOS SURVEY SAMPLE SUMMARY
VILLA TRANCHESE APARTMENTS - FIRE PROTECTION IMPROVEMENTS
307 Marshall Street, San Antonio, Texas
Terracon Project No. 90187143

SAMPLE NUMBER	MATERIAL DESCRIPTION	HOMOGENEOUS AREA	SAMPLE LOCATION	LAB RESULTS
V-78	Suspended Acoustical Ceiling Tile – 2' x 2', White with Fissures and Pinholes	Utilized on ceiling in Basement Office	Basement Office – South	No Asbestos Detected
V-79	Chilled Water Line Insulation and Mastic – Tan with white Mastic	Utilized on TSI in Basement in select locations	Basement at Pump Being Demo	No Asbestos Detected
V-80	Chilled Water Line Insulation and Mastic – Tan with white Mastic	Utilized on TSI in Basement in select locations	Basement – Pipe between Pump and Chiller	No Asbestos Detected
V-81	Chilled Water Line Insulation and Mastic – Tan with white Mastic	Utilized on TSI in Basement in select locations	Basement at Chiller being Demo	No Asbestos Detected
V-82	HVAC Duct Mastic – Black	Utilized on ducts of Air Handler Unit (AHU) in the Basement	Basement AHU – South	15% Chrysotile
V-83	HVAC Duct Mastic – Black	Utilized on ducts of Air Handler Unit (AHU) in the Basement	Basement AHU – South	15% Chrysotile
V-84	HVAC Duct Mastic – Black	Utilized on ducts of Air Handler Unit (AHU) in the Basement	Basement AHU – South	15% Chrysotile
V-85	Vibration Dampener – Black	Utilized on AHU in Basement	Basement AHU – Northwest	No Asbestos Detected
V-86	Vibration Dampener – Black	Utilized on AHU in Basement	Basement AHU – Northwest	No Asbestos Detected
V-87	Vibration Dampener – Black	Utilized on AHU in Basement	Basement AHU – Northwest	No Asbestos Detected
V-88	HVAC Duct Mastic – Black	Utilized on duct in Exterior Mechanical Room	Exterior Mechanical Room – Duct Central	15% Chrysotile
V-89	HVAC Duct Mastic – Black	Utilized on duct in Exterior Mechanical Room	Exterior Mechanical Room – Duct Central	15% Chrysotile
V-90	HVAC Duct Mastic – Black	Utilized on duct in Exterior Mechanical Room	Exterior Mechanical Room – Duct Central	15% Chrysotile
V-91	Chilled Water Line Insulation and Mastic – Tan with white Mastic	Utilized on TSI in Exterior Mechanical Room	Exterior Mechanical Room – Northeast	2% Amosite <1% Chrysotile

APPENDIX A
ASBESTOS SURVEY SAMPLE SUMMARY
VILLA TRANCHESE APARTMENTS - FIRE PROTECTION IMPROVEMENTS
307 Marshall Street, San Antonio, Texas
Terracon Project No. 90187143

SAMPLE NUMBER	MATERIAL DESCRIPTION	HOMOGENEOUS AREA	SAMPLE LOCATION	LAB RESULTS
V-92	Chilled Water Line Insulation and Mastic – Tan with white Mastic	Utilized on TSI in Exterior Mechanical Room	Exterior Mechanical Room – Northeast	2% Amosite <1% Chrysotile
V-93	Chilled Water Line Insulation and Mastic – Tan with white Mastic	Utilized on TSI in Exterior Mechanical Room	Exterior Mechanical Room – Southwest	2% Amosite <1% Chrysotile
V-94	Vibration Dampener – White	Utilized on AHU in Exterior Mechanical Room	Exterior Mechanical Room - Southwest	No Asbestos Detected
V-95	Vibration Dampener – White	Utilized on AHU in Exterior Mechanical Room	Exterior Mechanical Room - Southwest	No Asbestos Detected
V-96	Vibration Dampener – White	Utilized on AHU in Exterior Mechanical Room	Exterior Mechanical Room - Southwest	No Asbestos Detected
V-97	Drywall Construction – White with Smooth Texture	Utilized on walls in Exterior Mechanical Room	Exterior Mechanical Room – West	No Asbestos Detected
V-98	Drywall Construction – White with Smooth Texture	Utilized on walls in Exterior Mechanical Room	Exterior Mechanical Room – Southwest	No Asbestos Detected
V-99	Drywall Construction – White with Smooth Texture	Utilized on walls in Exterior Mechanical Room	Exterior Mechanical Room – Southeast	No Asbestos Detected
V-100	Resilient Floor Tile – 1' x 1', White with Brown Streaks with Black Mastic	Utilized on floor in Basement Office	Basement Office – Southeast	No Asbestos Detected
V-101	Resilient Floor Tile – 1' x 1', White with Brown Streaks with Black Mastic	Utilized on floor in Basement Office	Basement Office – Southeast	No Asbestos Detected
V-102	Resilient Floor Tile – 1' x 1', White with Brown Streaks with Black Mastic	Utilized on floor in Basement Office	Basement Office – Northwest	No Asbestos Detected

APPENDIX A
ASBESTOS SURVEY SAMPLE SUMMARY
VILLA TRANCHESE APARTMENTS - FIRE PROTECTION IMPROVEMENTS
307 Marshall Street, San Antonio, Texas
Terracon Project No. 90187143

SAMPLE NUMBER	MATERIAL DESCRIPTION	HOMOGENEOUS AREA	SAMPLE LOCATION	LAB RESULTS
V-103	CMU Texture – White	Utilized on walls in Basement	Basement Office – South	No Asbestos Detected
V-104	CMU Texture – White	Utilized on walls in Basement	Basement Office – East	No Asbestos Detected
V-105	CMU Texture – White	Utilized on walls in Basement	Basement Office – North	No Asbestos Detected
V-106	Caulking – Gray	Utilized on interior door and window frames in Basement Office	Basement Office – North	2% Chrysotile
V-107	Caulking – Gray	Utilized on interior door and window frames in Basement Office	Basement Office – at Door	2% Chrysotile
V-108	Caulking – Gray	Utilized on interior door and window frames in Basement Office	Basement Office – West	2% Chrysotile

APPENDIX B

CONFIRMED ASBESTOS-CONTAINING MATERIALS

APPENDIX B
CONFIRMED ASBESTOS-CONTAINING MATERIALS
VILLA TRANCHESE APARTMENTS - FIRE PROTECTION IMPROVEMENTS
307 Marshall Street, San Antonio, Texas
Terracon Project No. 90187143

SAMPLE NO.	MATERIAL DESCRIPTION	HOMOGENEOUS AREA	PERCENT / TYPE ASBESTOS	NESHAP CLASSIFICATION	MATERIAL CONDITION	ESTIMATED QUANTITY
V-01, 02, 03, 04, 05, 06, & 07	Drywall Construction – Multi-Colored with Light Orange Peel Texture	Utilized as walls, ceilings and furr downs throughout 1 st Floor (except in 1 st Floor Restrooms and Lease Space)	2% Chrysotile	RACM	Good	14,100 Sq. Ft.
V-11, 12, & 13	Drywall Construction – Tan with Knockdown Texture	Utilized on walls in the 1 st Floor Lease Space	2% Chrysotile	RACM	Good	4,400 Sq. Ft.
V-20, 21, & 22	Chilled Water Line Insulation and Mastic – Tan with white Mastic	Utilized on old TSI in 1 st Floor Mechanical Room (southeast pipes)	2% Amosite 5% Chrysotile	RACM	Good	50 Lin. Ft. Observed
V-23, 24, & 25	Drywall Construction – Tape and Float Only	Utilized on walls in 1 st Floor Mechanical Room	5% Chrysotile	RACM	Good	650 Sq. Ft.
V-43, 44, 45, 46, 47, 48, 49, 50, 51, 52, & 53	Drywall Construction – Multi-Colored with Medium Orange Peel Texture	Utilized on walls in Units (except perimeter walls)	2% Chrysotile	RACM	Good	*Undetermined
V-54, 55, 56, 57, 58, 59, 60, 61, 62, & 63	Drywall Construction – Multi-Colored with Smooth Texture	Utilized on ceilings of Restrooms in Units	2% Chrysotile	RACM	Good	*Undetermined
V-82, 83, & 84	HVAC Duct Mastic – Black	Utilized on ducts of Air Handler Unit (AHU) in the Basement	15% Chrysotile	Category I Non-Friable	Good	75 Sq. Ft.
V-88, 89, & 90	HVAC Duct Mastic – Black	Utilized on duct in Exterior Mechanical Room	15% Chrysotile	Category I Non-Friable	Good	75 Sq. Ft.

APPENDIX B
CONFIRMED ASBESTOS-CONTAINING MATERIALS
VILLA TRANCHESE APARTMENTS - FIRE PROTECTION IMPROVEMENTS
307 Marshall Street, San Antonio, Texas
Terracon Project No. 90187143

SAMPLE NO.	MATERIAL DESCRIPTION	HOMOGENEOUS AREA	PERCENT / TYPE ASBESTOS	NESHAP CLASSIFICATION	MATERIAL CONDITION	ESTIMATED QUANTITY
V-91, 92, & 93	Chilled Water Line Insulation and Mastic – Tan with white Mastic	Utilized on TSI in Exterior Mechanical Room	2% Amosite <1% Chrysotile	RACM	Good	60 Lin. Ft. Observed
V-106, 107, & 108	Caulking – Gray	Utilized on interior door and window frames in Basement Office	2% Chrysotile	Category I Non-Friable	Good	50 Lin. Ft.

* Due to the scope of the asbestos survey, total quantities of ACM materials located in the facility are undetermined.

Sq. Ft. = Square Feet

Lin. Ft. = Linear Feet

Category I: Includes asbestos-containing packings, gaskets, asphaltic roofing products, resilient flooring and associated mastics.

Category II: Includes any non-friable asbestos-containing material not categorized as Category I.

Regulated Asbestos-containing Material (RACM): Friable asbestos-containing materials and/or Category I and II non-friable asbestos-containing materials which have a high probability of or have become friable by forces expected to be exerted in the course of a renovation or demolition process.

APPENDIX C

ASBESTOS LABORATORY ANALYTICAL REPORT



PLM Summary Report

NVLAP Lab Code 102056-0
TDSHS License No. 30-0084

2051 Valley View Lane
Farmers Branch, TX 75234 Phone: (972) 241-8460

Client : Terracon - San Antonio Lab Job No. : 18B-04271
Project : Villa Tranchese Fire Protection Report Date : 04/13/2018
Project # : 90187143 Sample Date : 04/05/2018
Identification : Asbestos, Bulk Sample Analysis
Test Method : Polarized Light Microscopy / Dispersion Staining (PLM/DS)
EPA Method 600 / R-93 / 116

Page 1 of 9

On 4/9/2018, one hundred eight (108) bulk material samples were submitted by Gabriel Gonzalez of Terracon - San Antonio for asbestos analysis by PLM/DS. The PLM Detail Report is attached; additional information may be found therein. The results are summarized below:

Sample Number	Client Sample Description / Location	Asbestos Content
V-01	Drywall Construction	None Detected - Drywall Material None Detected - Joint Compound None Detected - Texture
V-02	Drywall Construction	None Detected - Drywall Material None Detected - Joint Compound None Detected - Texture
V-03	Drywall Construction	None Detected - Drywall Material None Detected - Joint Compound None Detected - Texture
V-04	Drywall Construction	None Detected - Drywall Material None Detected - Joint Compound None Detected - Texture
V-05	Drywall Construction	None Detected - Drywall Material 2% Chrysotile - Joint Compound 2% Chrysotile - Texture
V-06	Drywall Construction	None Detected - Drywall Material None Detected - Joint Compound None Detected - Texture
V-07	Drywall Construction	None Detected - Drywall Material None Detected - Joint Compound None Detected - Texture
V-08	Drywall Construction	None Detected - Drywall Material None Detected - Joint Compound None Detected - Texture
V-09	Drywall Construction	None Detected - Drywall Material None Detected - Joint Compound None Detected - Texture
V-10	Drywall Construction	None Detected - Drywall Material None Detected - Joint Compound None Detected - Texture



PLM Summary Report

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Client : Terracon - San Antonio	Lab Job No. : 18B-04271
Project : Villa Tranchese Fire Protection	Report Date : 04/13/2018
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Identification : Asbestos, Bulk Sample Analysis	
Test Method : Polarized Light Microscopy / Dispersion Staining (PLM/DS) EPA Method 600 / R-93 / 116	

On 4/9/2018, one hundred eight (108) bulk material samples were submitted by Gabriel Gonzalez of Terracon - San Antonio for asbestos analysis by PLM/DS. The PLM Detail Report is attached; additional information may be found therein. The results are summarized below:

Sample Number	Client Sample Description / Location	Asbestos Content
V-11	Drywall Construction	None Detected - Drywall Material 2% Chrysotile - Joint Compound 2% Chrysotile - Old Texture None Detected - New Texture
V-12	Drywall Construction	None Detected - Drywall Material None Detected - Joint Compound None Detected - Texture
V-13	Drywall Construction	None Detected - Drywall Material 2% Chrysotile - Joint Compound 2% Chrysotile - Old Texture None Detected - New Texture
V-14	Suspended Acoustic Ceiling Tile	None Detected - Acoustic Tile
V-15	Suspended Acoustic Ceiling Tile	None Detected - Acoustic Tile
V-16	Suspended Acoustic Ceiling Tile	None Detected - Acoustic Tile
V-17	TSI	None Detected - Vinyl Wrap None Detected - Paper / Foil Wrap None Detected - White Mastic
V-18	TSI	None Detected - Thermal Insulation None Detected - Paper / Foil Wrap None Detected - White Mastic
V-19	TSI	None Detected - Thermal Insulation None Detected - Paper / Foil Wrap None Detected - White Mastic
V-20	TSI	2% Amosite - Thermal Insulation <1% Chrysotile - Thermal Insulation None Detected - Glass Fiber Wrap 5% Chrysotile - Tar Wrap None Detected - Silver Paint



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Project : Villa Tranchese Fire Protection	Report Date : 04/13/2018
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Sample Number	Client Sample Description / Location	Asbestos Content
V-21	TSI	None Detected - Thermal Insulation None Detected - Glass Fiber Wrap 5% Chrysotile - Tar Wrap None Detected - Silver Paint
V-22	TSI	None Detected - Thermal Insulation None Detected - Paper/Tar/Foil Wrap None Detected - Glass Fiber Wrap 5% Chrysotile - Tar Wrap None Detected - Silver Paint
V-23	Drywall Construction	None Detected - Drywall Material 2% Chrysotile - Joint Compound
V-24	Drywall Construction	None Detected - Drywall Material 2% Chrysotile - Joint Compound
V-25	Drywall Construction	None Detected - Drywall Material None Detected - Joint Compound
V-26	Plaster	None Detected - Plaster None Detected - Textured Paint
V-27	Plaster	None Detected - Textured Paint
V-28	Plaster	None Detected - Plaster None Detected - Textured Paint
V-29	Mastic	None Detected - White Mastic
V-30	Mastic	None Detected - White Mastic
V-31	Mastic	None Detected - White Mastic
V-32	CMU Texture	None Detected - Paint
V-33	CMU Texture	None Detected - Texture
V-34	CMU Texture	None Detected - Paint
V-35	CMU Texture	None Detected - Texture



PLM Summary Report

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Project :	Villa Tranchese Fire Protection	Report Date :	04/13/2018
Project # :	90187143	Sample Date :	04/05/2018
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On 4/9/2018, one hundred eight (108) bulk material samples were submitted by Gabriel Gonzalez of Terracon - San Antonio for asbestos analysis by PLM/DS. The PLM Detail Report is attached; additional information may be found therein. The results are summarized below:

Sample Number	Client Sample Description / Location	Asbestos Content
V-36	CMU Texture	None Detected - Paint
V-37	CMU Texture	None Detected - Paint
V-38	CMU Texture	None Detected - Texture
V-39	CMU Texture	None Detected - Paint
V-40	CMU Texture	None Detected - Paint
V-41	CMU Texture	None Detected - Texture
V-42	CMU Texture	None Detected - Paint
V-43	Drywall Construction	None Detected - Drywall Material None Detected - Joint Compound None Detected - Texture
V-44	Drywall Construction	None Detected - Drywall Material 2% Chrysotile - Joint Compound 2% Chrysotile - Texture
V-45	Drywall Construction	None Detected - Drywall Material 2% Chrysotile - Joint Compound 2% Chrysotile - Texture
V-46	Drywall Construction	None Detected - Drywall Material 2% Chrysotile - Joint Compound 2% Chrysotile - Texture
V-47	Drywall Construction	None Detected - Drywall Material 2% Chrysotile - Joint Compound 2% Chrysotile - Texture
V-48	Drywall Construction	None Detected - Drywall Material 2% Chrysotile - Joint Compound 2% Chrysotile - Texture



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Project : Villa Tranchese Fire Protection	Report Date : 04/13/2018
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On 4/9/2018, one hundred eight (108) bulk material samples were submitted by Gabriel Gonzalez of Terracon - San Antonio for asbestos analysis by PLM/DS. The PLM Detail Report is attached; additional information may be found therein. The results are summarized below:

Sample Number	Client Sample Description / Location	Asbestos Content
V-49	Drywall Construction	None Detected - Drywall Material 2% Chrysotile - Joint Compound 2% Chrysotile - Old Texture None Detected - New Texture
V-50	Drywall Construction	None Detected - Drywall Material 2% Chrysotile - Joint Compound 2% Chrysotile - Texture
V-51	Drywall Construction	None Detected - Drywall Material 2% Chrysotile - Joint Compound 2% Chrysotile - Texture
V-52	Drywall Construction	None Detected - Drywall Material 2% Chrysotile - Joint Compound 2% Chrysotile - Old Texture None Detected - New Texture
V-53	Drywall Construction	None Detected - Drywall Material 2% Chrysotile - Joint Compound 2% Chrysotile - Texture
V-54	Drywall Construction	None Detected - Drywall Material 2% Chrysotile - Joint Compound 2% Chrysotile - Texture
V-55	Drywall Construction	None Detected - Drywall Material 2% Chrysotile - Joint Compound 2% Chrysotile - Texture
V-56	Drywall Construction	2% Chrysotile - Joint Compound 2% Chrysotile - Texture No Drywall
V-57	Drywall Construction	None Detected - Drywall Material 2% Chrysotile - Joint Compound 2% Chrysotile - Texture
V-58	Drywall Construction	None Detected - Drywall Material 2% Chrysotile - Joint Compound 2% Chrysotile - Texture



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Project :	Villa Tranchese Fire Protection	Report Date :	04/13/2018
Project # :	90187143	Sample Date :	04/05/2018
Identification :	Asbestos, Bulk Sample Analysis		
Test Method :	Polarized Light Microscopy / Dispersion Staining (PLM/DS) EPA Method 600 / R-93 / 116		

On 4/9/2018, one hundred eight (108) bulk material samples were submitted by Gabriel Gonzalez of Terracon - San Antonio for asbestos analysis by PLM/DS. The PLM Detail Report is attached; additional information may be found therein. The results are summarized below:

Sample Number	Client Sample Description / Location	Asbestos Content
V-59	Drywall Construction	None Detected - Drywall Material None Detected - Joint Compound None Detected - Texture
V-60	Drywall Construction	None Detected - Drywall Material 2% Chrysotile - Joint Compound 2% Chrysotile - Texture
V-61	Drywall Construction	None Detected - Drywall Material 2% Chrysotile - Joint Compound 2% Chrysotile - Texture
V-62	Drywall Construction	None Detected - Drywall Material 2% Chrysotile - Joint Compound 2% Chrysotile - Texture
V-63	Drywall Construction	None Detected - Drywall Material 2% Chrysotile - Joint Compound 2% Chrysotile - Texture
V-64	Drywall Construction	None Detected - Drywall Material None Detected - Joint Compound None Detected - Texture
V-65	Drywall Construction	None Detected - Drywall Material None Detected - Joint Compound None Detected - Texture
V-66	Drywall Construction	None Detected - Joint Compound None Detected - Texture
V-67	Acoustic Ceiling Tile and Mastic	None Detected - Acoustic Tile None Detected - Brown Mastic
V-68	Acoustic Ceiling Tile and Mastic	None Detected - Acoustic Tile None Detected - Brown Mastic
V-69	Acoustic Ceiling Tile and Mastic	None Detected - Acoustic Tile None Detected - Brown Mastic
V-70	CMU Texture	None Detected - Paint / Texture



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Project # :	90187143	Sample Date :	04/05/2018
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On 4/9/2018, one hundred eight (108) bulk material samples were submitted by Gabriel Gonzalez of Terracon - San Antonio for asbestos analysis by PLM/DS. The PLM Detail Report is attached; additional information may be found therein. The results are summarized below:

Sample Number	Client Sample Description / Location	Asbestos Content
V-71	CMU Texture	None Detected - Paint / Texture
V-72	CMU Texture	None Detected - Paint / Texture
V-73	Texture	None Detected - Paint / Texture
V-74	Texture	None Detected - Paint / Texture
V-75	Texture	None Detected - Paint / Texture
V-76	Suspended Acoustic Ceiling Tile	None Detected - Acoustic Tile
V-77	Suspended Acoustic Ceiling Tile	None Detected - Acoustic Tile
V-78	Suspended Acoustic Ceiling Tile	None Detected - Acoustic Tile
V-79	TSI	None Detected - Thermal Insulation None Detected - Foil Wrap None Detected - White Mastic
V-80	TSI	None Detected - Thermal Insulation None Detected - Paper / Foil Wrap None Detected - White Mastic
V-81	TSI	None Detected - Thermal Insulation None Detected - White Mastic
V-82	Mastic	15% Chrysotile - Mastic
V-83	Mastic	15% Chrysotile - Mastic
V-84	Mastic	15% Chrysotile - Mastic
V-85	Vibration Dampener	None Detected - Isolator Material
V-86	Vibration Dampener	None Detected - Isolator Material
V-87	Vibration Dampener	None Detected - Isolator Material
V-88	Mastic	15% Chrysotile - Mastic None Detected - Glass Fiber Mesh



PLM Summary Report

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Client :	Terracon - San Antonio	Lab Job No. :	18B-04271
Project :	Villa Tranchese Fire Protection	Report Date :	04/13/2018
Project # :	90187143	Sample Date :	04/05/2018
Identification :	Asbestos, Bulk Sample Analysis		
Test Method :	Polarized Light Microscopy / Dispersion Staining (PLM/DS) EPA Method 600 / R-93 / 116		

On 4/9/2018, one hundred eight (108) bulk material samples were submitted by Gabriel Gonzalez of Terracon - San Antonio for asbestos analysis by PLM/DS. The PLM Detail Report is attached; additional information may be found therein. The results are summarized below:

Sample Number	Client Sample Description / Location	Asbestos Content
V-89	Mastic	15% Chrysotile - Mastic None Detected - Glass Fiber Mesh
V-90	Mastic	15% Chrysotile - Mastic None Detected - Glass Fiber Mesh None Detected - Paper / Foil Wrap
V-91	TSI	2% Amosite - Thermal Insulation <1% Chrysotile - Thermal Insulation None Detected - Cotton Wrap None Detected - White Mastic
V-92	TSI	2% Amosite - Thermal Insulation <1% Chrysotile - Thermal Insulation None Detected - Cotton Wrap None Detected - White Mastic
V-93	TSI	2% Amosite - Thermal Insulation <1% Chrysotile - Thermal Insulation None Detected - Cotton Wrap None Detected - White Mastic
V-94	Vibration Dampener	None Detected - Isolator Material
V-95	Vibration Dampener	None Detected - Isolator Material
V-96	Vibration Dampener	None Detected - Isolator Material
V-97	Drywall Construction	None Detected - Drywall Material None Detected - Joint Compound None Detected - Texture
V-98	Drywall Construction	None Detected - Drywall Material None Detected - Joint Compound None Detected - Texture
V-99	Drywall Construction	None Detected - Drywall Material None Detected - Joint Compound None Detected - Texture



PLM Summary Report

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2051 Valley View Lane
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Client :	Terracon - San Antonio	Lab Job No. :	18B-04271
Project :	Villa Tranchese Fire Protection	Report Date :	04/13/2018
Project # :	90187143	Sample Date :	04/05/2018
Identification :	Asbestos, Bulk Sample Analysis		
Test Method :	Polarized Light Microscopy / Dispersion Staining (PLM/DS) EPA Method 600 / R-93 / 116		

On 4/9/2018, one hundred eight (108) bulk material samples were submitted by Gabriel Gonzalez of Terracon - San Antonio for asbestos analysis by PLM/DS. The PLM Detail Report is attached; additional information may be found therein. The results are summarized below:

Sample Number	Client Sample Description / Location	Asbestos Content
V-100	Resilient Floor Tile	None Detected - Floor Tile None Detected - Yellow Mastic
V-101	Resilient Floor Tile	None Detected - Floor Tile None Detected - Yellow Mastic
V-102	Resilient Floor Tile	None Detected - Floor Tile None Detected - Yellow Mastic
V-103	CMU Texture	None Detected - Paint / Texture
V-104	CMU Texture	None Detected - Paint / Texture
V-105	CMU Texture	None Detected - Paint / Texture
V-106	Caulking	2% Chrysotile - Texture
V-107	Caulking	2% Chrysotile - Texture
V-108	Caulking	2% Chrysotile - Texture

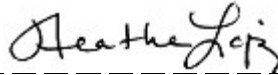
These samples were analyzed by layers. Quantification, unless otherwise noted, is performed by calibrated visual estimate. The test report shall not be reproduced, except in full, without written approval of the laboratory. The results relate only to the items tested. These test results do not imply endorsement by NVLAP or any agency of the U.S. Government. Accredited by the National Voluntary Laboratory Accreditation Program for Bulk Asbestos Fiber Analysis under Lab Code 102056-0.




Analyst(s): Heather Lopez, Tommie Smith

Lab Manager : Heather Lopez

Lab Director : Bruce Crabb

Approved Signatory : 

Approved Signatory : 

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Moody Labs
 2051 Valley View Lane
 Farmers Branch, TX 75234 Phone: (972) 241-8460

PLM Detail Report
Supplement to PLM Summary Report

NVLAP Lab Code 102056-0
 TDSHS License No. 30-0084

Client : Terracon - San Antonio
 Project : Villa Tranchese Fire Protection
 Project # : 90187143

Lab Job No. : 18B-04271
 Report Date : 04/13/2018

Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
V-01	Drywall Material (Light Pink)	50%	Glass Wool Fibers	2%	04/12	HL
			Gypsum / Binders	98%		
	DW Paper / Tape (Tan / White)	20%	Cellulose Fibers	100%		
	Joint Compound (White)	15%	Calcite / Talc / Binders	100%		
	Texture (White)	15%	Calcite / Talc / Binders	100%		
V-02	Drywall Material (Light Pink)	50%	Glass Wool Fibers	2%	04/12	HL
			Gypsum / Binders	98%		
	DW Paper / Tape (Tan / White)	20%	Cellulose Fibers	100%		
	Joint Compound (White)	15%	Calcite / Talc / Binders	100%		
	Texture (White)	15%	Calcite / Talc / Binders	100%		
V-03	Drywall Material (Light Pink)	50%	Glass Wool Fibers	2%	04/12	HL
			Gypsum / Binders	98%		
	DW Paper / Tape (Tan / White)	20%	Cellulose Fibers	100%		
	Joint Compound (White)	15%	Calcite / Talc / Binders	100%		
	Texture (White)	15%	Calcite / Talc / Binders	100%		
V-04	Drywall Material (Light Pink)	40%	Glass Wool Fibers	2%	04/12	HL
			Gypsum / Binders	98%		
	DW Paper / Tape (Tan / White)	20%	Cellulose Fibers	100%		
	Joint Compound (White)	20%	Calcite / Talc / Binders	100%		
	Texture (White)	20%	Calcite / Talc / Binders	100%		
V-05	Drywall Material (White)	40%	Cellulose Fibers	5%	04/12	HL
			Gypsum / Binders	95%		
	DW Paper / Tape (Tan / White)	20%	Cellulose Fibers	100%		
	Joint Compound (White)	20%	Chrysotile	2%		
			Calcite / Talc / Binders	98%		
	Texture (White)	20%	Chrysotile	2%		
			Calcite / Talc / Binders	98%		

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Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
V-06	Drywall Material (Light Pink)	50%	Glass Wool Fibers	2%	04/12	HL
			Gypsum / Binders	98%		
	DW Paper / Tape (Tan / White)	20%	Cellulose Fibers	100%		
	Joint Compound (White)	15%	Calcite / Talc / Binders	100%		
	Texture (White)	15%	Calcite / Talc / Binders	100%		
V-07	Drywall Material (Light Pink)	20%	Glass Wool Fibers	2%	04/12	HL
			Gypsum / Binders	98%		
	DW Paper / Tape (Tan / White)	40%	Cellulose Fibers	100%		
	Joint Compound (White)	20%	Calcite / Talc / Binders	100%		
	Texture (White)	20%	Calcite / Talc / Binders	100%		
V-08	Drywall Material (Light Pink)	50%	Glass Wool Fibers	2%	04/12	HL
			Gypsum / Binders	98%		
	DW Paper / Tape (Tan / White)	20%	Cellulose Fibers	100%		
	Joint Compound (White)	15%	Calcite / Talc / Binders	100%		
	Texture (White)	15%	Calcite / Talc / Binders	100%		
V-09	Drywall Material (Light Pink)	60%	Glass Wool Fibers	2%	04/12	HL
			Gypsum / Binders	98%		
	DW Paper / Tape (Tan / White)	20%	Cellulose Fibers	100%		
	Joint Compound (White)	10%	Calcite / Talc / Binders	100%		
	Texture (White)	10%	Calcite / Talc / Binders	100%		
V-10	Drywall Material (Light Pink)	50%	Glass Wool Fibers	2%	04/12	HL
			Gypsum / Binders	98%		
	DW Paper / Tape (Tan / White)	20%	Cellulose Fibers	100%		
	Joint Compound (White)	15%	Calcite / Talc / Binders	100%		
	Texture (White)	15%	Calcite / Talc / Binders	100%		

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Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
V-11	Drywall Material (White)	25%	Cellulose Fibers	5%	04/12	HL
			Gypsum / Binders	95%		
	DW Paper / Tape (Tan / White)	30%	Cellulose Fibers	100%		
			Joint Compound (White)	15%		
	Old Texture (White)	15%	Calcite / Talc / Binders	98%		
			Chrysotile	2%		
New Texture (White)	15%	Calcite / Talc / Binders	98%			
V-12	Drywall Material (White)	25%	Cellulose Fibers	5%	04/12	HL
			Gypsum / Binders	95%		
	DW Paper / Tape (Tan / White)	25%	Cellulose Fibers	100%		
	Joint Compound (White)	25%	Calcite / Talc / Binders	100%		
	Texture (White)	25%	Calcite / Talc / Binders	100%		
V-13	Drywall Material (White)	20%	Cellulose Fibers	5%	04/12	HL
			Gypsum / Binders	95%		
	DW Paper / Tape (Tan / White)	20%	Cellulose Fibers	100%		
	Joint Compound (White)	20%	Chrysotile	2%		
	Old Texture (White)	20%	Calcite / Talc / Binders	98%		
			Chrysotile	2%		
New Texture (White)	20%	Calcite / Talc / Binders	98%			
V-14	Acoustic Tile (Off-White)	100%	Mineral Wool Fibers	95%	04/12	HL
			Binders / Fillers	5%		
V-15	Acoustic Tile (Off-White)	100%	Mineral Wool Fibers	95%	04/12	HL
			Binders / Fillers	5%		
V-16	Acoustic Tile (Off-White)	100%	Mineral Wool Fibers	95%	04/12	HL
			Binders / Fillers	5%		

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Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
V-17	Vinyl Wrap (White)	75%	Vinyl Binders	100%	04/12	HL
	Paper / Foil Wrap (White / Silver)	20%	Cellulose Fibers	60%		
			Glass Wool Fibers	20%		
			Metal Foil	20%		
White Mastic (White)	5%	Synthetic Fibers	3%			
			Binders / Fillers	97%		
V-18	Thermal Insulation (Yellow)	75%	Mineral Wool Fibers	95%	04/12	HL
	Paper / Foil Wrap (White / Silver)	20%	Resin Binders	5%		
			Cellulose Fibers	60%		
			Glass Wool Fibers	20%		
White Mastic (White)	5%	Metal Foil	20%			
			Synthetic Fibers	3%		
			Binders / Fillers	97%		
V-19	Thermal Insulation (Yellow)	75%	Mineral Wool Fibers	95%	04/12	HL
	Paper / Foil Wrap (White / Silver)	20%	Resin Binders	5%		
			Cellulose Fibers	60%		
			Glass Wool Fibers	20%		
White Mastic (White)	5%	Metal Foil	20%			
			Synthetic Fibers	3%		
			Binders / Fillers	97%		
V-20	Thermal Insulation (Light Grey)	65%	Amosite	2%	04/12	HL
			Chrysotile	<1%		
			Mineral Wool Fibers	25%		
			Binders / Fillers	73%		
	Glass Fiber Wrap (White)	10%	Glass Wool Fibers	100%		
	Tar Wrap (Black)	20%	Chrysotile	5%		
Glass Wool Fibers			5%			
			Tar Binders	90%		
			Silver Paint (Silver)	5%		
			Pigment / Binders	100%		

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Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
V-21	Thermal Insulation (Yellow)	15%	Mineral Wool Fibers	95%	04/12	HL
			Resin Binders	5%		
	Glass Fiber Wrap (White)	25%	Glass Wool Fibers	100%		
	Tar Wrap (Black)	55%	Chrysotile	5%		
			Glass Wool Fibers	5%		
			Tar Binders	90%		
	Silver Paint (Silver)	5%	Pigment / Binders	100%		
V-22	Thermal Insulation (Yellow)	25%	Mineral Wool Fibers	95%	04/12	HL
			Resin Binders	5%		
	Paper/Tar/Foil Wrap (Tan / Silver)	60%	Cellulose Fibers	50%		
			Tar Binders	30%		
			Metal Foil	20%		
	Glass Fiber Wrap (White)	5%	Glass Wool Fibers	100%		
	Tar Wrap (Black)	5%	Chrysotile	5%		
		Glass Wool Fibers	5%			
			Tar Binders	90%		
	Silver Paint (Silver)	5%	Pigment / Binders	100%		
V-23	Drywall Material (White)	50%	Cellulose Fibers	5%	04/12	HL
			Gypsum / Binders	95%		
	DW Paper Facing (Tan)	25%	Cellulose Fibers	100%		
	Joint Compound (White)	25%	Chrysotile	2%		
			Calcite / Talc / Binders	98%		
V-24	Drywall Material (White)	80%	Cellulose Fibers	5%	04/12	HL
			Gypsum / Binders	95%		
	DW Paper / Tape (Tan / White)	10%	Cellulose Fibers	100%		
	Joint Compound (White)	10%	Chrysotile	2%		
			Calcite / Talc / Binders	98%		

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V-25	Drywall Material (White)	60%	Cellulose Fibers	5%	04/12	HL
			Gypsum / Binders	95%		
	DW Paper / Tape (Tan / White)	25%	Cellulose Fibers	100%		
	Joint Compound (White)	15%	Calcite / Talc / Binders	100%		
V-26	Plaster (Grey)	20%	Aggregate	65%	04/12	HL
			Calcite / Binders	35%		
	Textured Paint (Blue)	80%	Calcite	20%		
			Pigment / Binders	80%		
V-27	Textured Paint (Blue)	100%	Calcite	20%	04/12	HL
			Pigment / Binders	80%		
V-28	Plaster (Grey)	35%	Aggregate	65%	04/12	HL
			Calcite / Binders	35%		
	Textured Paint (Blue)	65%	Calcite	20%		
			Pigment / Binders	80%		
V-29	White Mastic (White)	100%	Cellulose Fibers	3%	04/12	HL
			Calcite	50%		
			Binders / Fillers	47%		
V-30	White Mastic (White)	100%	Cellulose Fibers	3%	04/12	HL
			Calcite	50%		
			Binders / Fillers	47%		
V-31	White Mastic (White)	100%	Cellulose Fibers	3%	04/12	HL
			Calcite	50%		
			Binders / Fillers	47%		
V-32	Paint (Off-White)	100%	Pigment / Binders	100%	04/13	HL
V-33	Texture (White)	100%	Calcite / Talc / Binders	100%	04/13	HL
V-34	Paint (Off-White)	100%	Pigment / Binders	100%	04/13	HL
V-35	Texture (White)	100%	Calcite / Talc / Binders	100%	04/13	HL

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Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
V-36	Mortar (Light Grey)	35%	Aggregate	65%	04/13	HL
			Cement Binders	35%		
	Paint (Off-White)	65%	Pigment / Binders	100%		
V-37	Mortar (Light Grey)	35%	Aggregate	65%	04/13	HL
			Cement Binders	35%		
	Paint (Off-White)	65%	Pigment / Binders	100%		
V-38	Texture (White)	100%	Calcite / Talc / Binders	100%	04/13	HL
V-39	Paint (Off-White)	100%	Pigment / Binders	100%	04/13	HL
V-40	Paint (Off-White)	100%	Pigment / Binders	100%	04/13	HL
V-41	Texture (White)	100%	Calcite / Talc / Binders	100%	04/13	HL
V-42	Paint (Off-White)	100%	Pigment / Binders	100%	04/13	HL
V-43	Drywall Material (White)	80%	Glass Wool Fibers	2%	04/13	HL
			Cellulose Fibers	1%		
			Gypsum / Binders	97%		
	DW Paper / Tape (Tan / White)	10%	Cellulose Fibers	100%		
	Joint Compound (White)	5%	Calcite / Talc / Binders	100%		
	Texture (White)	5%	Calcite / Talc / Binders	100%		
V-44	Drywall Material (White)	80%	Cellulose Fibers	5%	04/13	HL
			Gypsum / Binders	95%		
	DW Paper / Tape (Tan / White)	10%	Cellulose Fibers	100%		
	Joint Compound (Off-White)	5%	Chrysotile	2%		
			Calcite / Gypsum Binders	98%		
	Texture (Off-White)	5%	Chrysotile	2%		
			Calcite / Talc / Binders	98%		

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Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
V-45	Drywall Material (Brown)	70%	Cellulose Fibers	5%	04/13	HL
			Gypsum / Binders	95%		
	DW Paper / Tape (Tan / White)	10%	Cellulose Fibers	100%		
	Joint Compound (White)	10%	Chrysotile	2%		
			Calcite / Talc / Binders	98%		
V-46	Drywall Material (White)	35%	Cellulose Fibers	5%	04/13	HL
			Gypsum / Binders	95%		
	DW Paper / Tape (Tan / White)	30%	Cellulose Fibers	100%		
	Joint Compound (White)	15%	Chrysotile	2%		
			Calcite / Talc / Binders	98%		
V-47	Drywall Material (White)	50%	Cellulose Fibers	5%	04/13	HL
			Gypsum / Binders	95%		
	DW Paper / Tape (Tan / White)	20%	Cellulose Fibers	100%		
	Joint Compound (White)	20%	Chrysotile	2%		
			Calcite / Talc / Binders	98%		
V-48	Drywall Material (White)	70%	Cellulose Fibers	5%	04/13	HL
			Gypsum / Binders	95%		
	DW Paper / Tape (Tan / White)	10%	Cellulose Fibers	100%		
	Joint Compound (White)	10%	Chrysotile	2%		
			Calcite / Talc / Binders	98%		
	Texture (White)	10%	Chrysotile	2%		
			Calcite / Talc / Binders	98%		

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Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
V-49	Drywall Material (White)	55%	Cellulose Fibers	5%	04/13	HL
			Gypsum / Binders	95%		
	DW Paper / Tape (Tan / White)	20%	Cellulose Fibers	100%		
	Joint Compound (White)	10%	Chrysotile	2%		
			Calcite / Talc / Binders	98%		
			Chrysotile	2%		
	Old Texture (White)	10%	Calcite / Talc / Binders	98%		
	New Texture (White)	5%	Calcite / Talc / Binders	100%		
V-50	Drywall Material (White)	35%	Cellulose Fibers	5%	04/13	HL
			Gypsum / Binders	95%		
	DW Paper / Tape (Tan / White)	25%	Cellulose Fibers	100%		
	Joint Compound (White)	20%	Chrysotile	2%		
			Calcite / Talc / Binders	98%		
			Chrysotile	2%		
	Texture (White)	20%	Calcite / Talc / Binders	98%		
V-51	Drywall Material (White)	30%	Cellulose Fibers	5%	04/13	HL
			Gypsum / Binders	95%		
	DW Paper / Tape (Tan / White)	20%	Cellulose Fibers	100%		
	Joint Compound (White)	25%	Chrysotile	2%		
			Calcite / Talc / Binders	98%		
			Chrysotile	2%		
	Texture (White)	25%	Calcite / Talc / Binders	98%		
V-52	Drywall Material (White)	55%	Cellulose Fibers	5%	04/13	HL
			Gypsum / Binders	95%		
	DW Paper / Tape (Tan / White)	20%	Cellulose Fibers	100%		
	Joint Compound (White)	10%	Chrysotile	2%		
			Calcite / Talc / Binders	98%		
			Chrysotile	2%		
	Old Texture (White)	10%	Calcite / Talc / Binders	98%		
	New Texture (White)	5%	Calcite / Talc / Binders	100%		

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Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
V-53	Drywall Material (White)	70%	Cellulose Fibers	5%	04/13	HL
			Gypsum / Binders	95%		
	DW Paper / Tape (Tan / White)	10%	Cellulose Fibers	100%		
	Joint Compound (White)	10%	Chrysotile	2%		
			Calcite / Talc / Binders	98%		
V-54	Drywall Material (Brown)	5%	Glass Wool Fibers	2%	04/12	TS
			Cellulose Fibers	1%		
			Gypsum / Binders	97%		
	DW Paper / Tape (Tan / White)	35%	Cellulose Fibers	100%		
	Joint Compound (Tan)	15%	Chrysotile	2%		
V-55	Drywall Material (White)	10%	Glass Wool Fibers	2%	04/12	TS
			Cellulose Fibers	1%		
			Gypsum / Binders	97%		
	DW Paper / Tape (Tan / White)	40%	Cellulose Fibers	100%		
	Joint Compound (Tan)	15%	Chrysotile	2%		
V-56	DW Paper / Tape (Tan / White)	20%	Cellulose Fibers	100%	04/12	TS
	Joint Compound (Tan)	30%	Chrysotile	2%		
			Calcite / Talc / Binders	98%		
	Texture (White)	50%	Chrysotile	2%		
			Calcite / Talc / Binders	98%		
	No Drywall					

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Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
V-57	Drywall Material (Brown)	15%	Glass Wool Fibers	2%	04/12	TS
			Cellulose Fibers	1%		
			Gypsum / Binders	97%		
	DW Paper / Tape (Tan / White)	35%	Cellulose Fibers	100%		
	Joint Compound (Tan)	15%	Chrysotile	2%		
			Calcite / Talc / Binders	98%		
Texture (White)	35%	Chrysotile	2%			
		Calcite / Talc / Binders	98%			
V-58	Drywall Material (White)	15%	Glass Wool Fibers	2%	04/12	TS
			Cellulose Fibers	1%		
			Gypsum / Binders	97%		
	DW Paper / Tape (Tan / White)	30%	Cellulose Fibers	100%		
	Joint Compound (Tan)	30%	Chrysotile	2%		
			Calcite / Talc / Binders	98%		
Texture (White)	25%	Chrysotile	2%			
		Calcite / Talc / Binders	98%			
V-59	Drywall Material (Brown)	30%	Glass Wool Fibers	2%	04/12	TS
			Cellulose Fibers	1%		
			Gypsum / Binders	97%		
	DW Paper / Tape (Tan / White)	35%	Cellulose Fibers	100%		
	Joint Compound (White)	15%	Calcite / Talc / Binders	100%		
			Texture (White)	20%		
V-60	Drywall Material (Brown)	10%	Glass Wool Fibers	2%	04/12	TS
			Cellulose Fibers	1%		
			Gypsum / Binders	97%		
	DW Paper / Tape (Tan / White)	35%	Cellulose Fibers	100%		
	Joint Compound (Tan)	30%	Chrysotile	2%		
			Calcite / Talc / Binders	98%		
Texture (White)	25%	Chrysotile	2%			
		Calcite / Talc / Binders	98%			

Moody Labs
 2051 Valley View Lane
 Farmers Branch, TX 75234 Phone: (972) 241-8460

PLM Detail Report
 Supplement to PLM Summary Report

NVLAP Lab Code 102056-0
 TDSHS License No. 30-0084

Client : Terracon - San Antonio
 Project : Villa Tranchese Fire Protection
 Project # : 90187143

Lab Job No. : 18B-04271
 Report Date : 04/13/2018

Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
V-61	Drywall Material (Brown)	10%	Glass Wool Fibers	2%	04/12	TS
			Cellulose Fibers	1%		
			Gypsum / Binders	97%		
	DW Paper / Tape (Tan / White)	35%	Cellulose Fibers	100%		
	Joint Compound (Tan)	30%	Chrysotile	2%		
			Calcite / Talc / Binders	98%		
Texture (White)	25%	Chrysotile	2%			
		Calcite / Talc / Binders	98%			
V-62	Drywall Material (White)	10%	Glass Wool Fibers	2%	04/12	TS
			Cellulose Fibers	1%		
			Gypsum / Binders	97%		
	DW Paper / Tape (Tan / White)	35%	Cellulose Fibers	100%		
	Joint Compound (Tan)	30%	Chrysotile	2%		
			Calcite / Talc / Binders	98%		
Texture (White)	25%	Chrysotile	2%			
		Calcite / Talc / Binders	98%			
V-63	Drywall Material (White)	15%	Glass Wool Fibers	2%	04/12	TS
			Cellulose Fibers	1%		
			Gypsum / Binders	97%		
	DW Paper / Tape (Tan / White)	35%	Cellulose Fibers	100%		
	Joint Compound (Tan)	25%	Chrysotile	2%		
			Calcite / Talc / Binders	98%		
Texture (White)	25%	Chrysotile	2%			
		Calcite / Talc / Binders	98%			
V-64	Drywall Material (White)	35%	Glass Wool Fibers	2%	04/12	TS
			Cellulose Fibers	1%		
			Gypsum / Binders	97%		
	DW Paper / Tape (Tan / White)	35%	Cellulose Fibers	100%		
	Joint Compound (White)	15%	Calcite / Talc / Binders	100%		
	Texture (White)	15%	Calcite / Talc / Binders	100%		

Moody Labs
 2051 Valley View Lane
 Farmers Branch, TX 75234 Phone: (972) 241-8460

PLM Detail Report
 Supplement to PLM Summary Report

NVLAP Lab Code 102056-0
 TDSHS License No. 30-0084

Client : Terracon - San Antonio
 Project : Villa Tranchese Fire Protection
 Project # : 90187143

Lab Job No. : 18B-04271
 Report Date : 04/13/2018

Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst		
V-65	Drywall Material (White)	25%	Glass Wool Fibers	2%	04/12	TS		
			Cellulose Fibers	1%				
			Gypsum / Binders	97%				
	DW Paper / Tape (Tan / White)	25%	Cellulose Fibers	100%				
Joint Compound (White)	20%	Calcite / Talc / Binders	100%					
		Texture (White)	30%	Talc Fibers	5%			
V-66	DW Tape (White)	10%	Calcite / Talc / Binders	95%	04/12	TS		
			Cellulose Fibers	100%				
			Joint Compound (White)	60%			Talc Fibers	5%
			Texture (White)	30%			Calcite / Talc / Binders	95%
V-67	Acoustic Tile (Off-White)	10%	Mineral Wool Fibers	95%	04/12	TS		
			Binders / Fillers	5%				
	Brown Mastic (Brown)	90%	Talc Fibers	2%				
			Glue Binders	98%				
V-68	Acoustic Tile (Off-White)	15%	Mineral Wool Fibers	95%	04/12	TS		
			Binders / Fillers	5%				
	Brown Mastic (Brown)	85%	Talc Fibers	2%				
			Glue Binders	98%				
V-69	Acoustic Tile (Off-White)	15%	Mineral Wool Fibers	95%	04/12	TS		
			Binders / Fillers	5%				
	Brown Mastic (Brown)	85%	Talc Fibers	2%				
			Glue Binders	98%				
V-70	Paint / Texture (White)	100%	Calcite	25%	04/12	TS		
			Pigment / Binders	75%				
V-71	Paint / Texture (White)	100%	Calcite	25%	04/12	TS		
			Pigment / Binders	75%				
V-72	Paint / Texture (White)	100%	Calcite	25%	04/12	TS		
			Pigment / Binders	75%				

Moody Labs
 2051 Valley View Lane
 Farmers Branch, TX 75234 Phone: (972) 241-8460

PLM Detail Report
 Supplement to PLM Summary Report

NVLAP Lab Code 102056-0
 TDSHS License No. 30-0084

Client : Terracon - San Antonio
 Project : Villa Tranchese Fire Protection
 Project # : 90187143

Lab Job No. : 18B-04271
 Report Date : 04/13/2018

Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
V-73	Paint / Texture (White)	100%	Calcite	25%	04/12	TS
			Pigment / Binders	75%		
V-74	Paint / Texture (White)	100%	Calcite	25%	04/12	TS
			Pigment / Binders	75%		
V-75	Paint / Texture (White)	100%	Calcite	25%	04/12	TS
			Pigment / Binders	75%		
V-76	Acoustic Tile (Light Grey)	100%	Cellulose Fibers	50%	04/12	TS
			Mineral Wool Fibers	30%		
			Perlite	20%		
V-77	Acoustic Tile (Off-White)	100%	Mineral Wool Fibers	95%	04/12	TS
			Binders / Fillers	5%		
V-78	Acoustic Tile (Light Grey)	100%	Cellulose Fibers	50%	04/12	TS
			Mineral Wool Fibers	30%		
			Perlite	20%		
V-79	Thermal Insulation (Yellow)	10%	Mineral Wool Fibers	95%	04/12	TS
			Resin Binders	5%		
	Foil Wrap (Silver)	1%	Metal Foil	100%		
	White Mastic (White)	89%	Wollastonite	5%		
V-80			Binders / Fillers	95%	04/12	TS
	Thermal Insulation (Yellow)	<1%	Mineral Wool Fibers	95%		
			Resin Binders	5%		
	Paper / Foil Wrap (Tan / Silver)	25%	Cellulose Fibers	60%		
			Glass Wool Fibers	20%		
V-81			Metal Foil	20%	04/12	TS
	White Mastic (White)	75%	Wollastonite	5%		
			Binders / Fillers	95%		
	Thermal Insulation (Yellow)	10%	Mineral Wool Fibers	95%		
V-81			Resin Binders	5%	04/12	TS
	White Mastic (White)	90%	Wollastonite	5%		
			Binders / Fillers	95%		
			Mineral Wool Fibers	95%		

Moody Labs
 2051 Valley View Lane
 Farmers Branch, TX 75234 Phone: (972) 241-8460

PLM Detail Report
 Supplement to PLM Summary Report

NVLAP Lab Code 102056-0
 TDSHS License No. 30-0084

Client : Terracon - San Antonio
 Project : Villa Tranchese Fire Protection
 Project # : 90187143

Lab Job No. : 18B-04271
 Report Date : 04/13/2018

Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
V-82	Mastic (Black)	100%	Chrysotile	15%	04/12	TS
			Calcite / Tar Binders	85%		
V-83	Mastic (Black)	100%	Chrysotile	15%	04/12	TS
			Calcite / Tar Binders	85%		
V-84	Mastic (Black)	100%	Chrysotile	15%	04/12	TS
			Calcite / Tar Binders	85%		
V-85	Isolator Material (Off-White)	100%	Cotton Fibers	100%	04/12	TS
V-86	Isolator Material (Off-White)	100%	Cotton Fibers	100%	04/12	TS
V-87	Isolator Material (Off-White)	100%	Cotton Fibers	100%	04/12	TS
V-88	Mastic (Black)	95%	Chrysotile	15%	04/12	TS
			Calcite / Tar Binders	85%		
	Glass Fiber Mesh (White)	5%	Glass Wool Fibers	100%		
V-89	Mastic (Black)	95%	Chrysotile	15%	04/12	TS
			Calcite / Tar Binders	85%		
	Glass Fiber Mesh (White)	5%	Glass Wool Fibers	100%		
V-90	Mastic (Black)	90%	Chrysotile	15%	04/12	TS
			Calcite / Tar Binders	85%		
	Glass Fiber Mesh (White)	5%	Glass Wool Fibers	100%		
	Paper / Foil Wrap (Tan / Silver)	5%	Cellulose Fibers	60%		
			Glass Wool Fibers	20%		
			Metal Foil	20%		
V-91	Thermal Insulation (Light Grey)	70%	Amosite	2%	04/12	TS
			Chrysotile	<1%		
			Mineral Wool Fibers	25%		
			Binders / Fillers	73%		
	Cotton Wrap (Off-White)	25%	Cotton Fibers	100%		
White Mastic (White)	5%	Calcite	50%			
			Pigment / Binders	50%		

Moody Labs
 2051 Valley View Lane
 Farmers Branch, TX 75234 Phone: (972) 241-8460

PLM Detail Report
 Supplement to PLM Summary Report

NVLAP Lab Code 102056-0
 TDSHS License No. 30-0084

Client : Terracon - San Antonio
 Project : Villa Tranchese Fire Protection
 Project # : 90187143

Lab Job No. : 18B-04271
 Report Date : 04/13/2018

Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
V-92	Thermal Insulation (Light Grey)	70%	Amosite	2%	04/12	TS
			Chrysotile	<1%		
			Mineral Wool Fibers	25%		
			Binders / Fillers	73%		
	Cotton Wrap (Off-White)	25%	Cotton Fibers	100%		
	White Mastic (White)	5%	Calcite	50%		
			Pigment / Binders	50%		
V-93	Thermal Insulation (Light Grey)	40%	Amosite	2%	04/12	TS
			Chrysotile	<1%		
			Mineral Wool Fibers	25%		
			Binders / Fillers	73%		
	Cotton Wrap (Off-White)	55%	Cotton Fibers	100%		
	White Mastic (White)	5%	Calcite	50%		
			Pigment / Binders	50%		
V-94	Isolator Material (Off-White)	100%	Cotton Fibers	100%	04/12	TS
V-95	Isolator Material (Off-White)	100%	Cotton Fibers	100%	04/12	TS
V-96	Isolator Material (Off-White)	100%	Cotton Fibers	100%	04/12	TS
V-97	Drywall Material (White)	25%	Glass Wool Fibers	2%	04/12	TS
			Cellulose Fibers	1%		
			Gypsum / Binders	97%		
	DW Paper / Tape (Tan / White)	40%	Cellulose Fibers	100%		
	Joint Compound (White)	10%	Calcite / Talc / Binders	100%		
	Texture (White)	25%	Calcite / Talc / Binders	100%		
V-98	Drywall Material (White)	25%	Glass Wool Fibers	2%	04/12	TS
			Cellulose Fibers	1%		
			Gypsum / Binders	97%		
	DW Paper / Tape (Tan / White)	35%	Cellulose Fibers	100%		
	Joint Compound (White)	15%	Calcite / Talc / Binders	100%		
	Texture (White)	25%	Calcite / Talc / Binders	100%		

Moody Labs
 2051 Valley View Lane
 Farmers Branch, TX 75234 Phone: (972) 241-8460

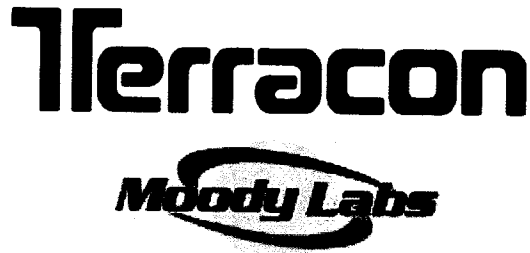
PLM Detail Report
 Supplement to PLM Summary Report

NVLAP Lab Code 102056-0
 TDSHS License No. 30-0084

Client : Terracon - San Antonio
 Project : Villa Tranchese Fire Protection
 Project # : 90187143

Lab Job No. : 18B-04271
 Report Date : 04/13/2018

Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
V-99	Drywall Material (White)	80%	Glass Wool Fibers	2%	04/12	TS
			Cellulose Fibers	1%		
			Gypsum / Binders	97%		
	DW Paper / Tape (Tan / White)	10%	Cellulose Fibers	100%		
	Joint Compound (White)	5%	Calcite / Talc / Binders	100%		
	Texture (White)	5%	Calcite / Talc / Binders	100%		
V-100	Floor Tile (Off-White)	99%	Calcite / Vinyl Binders	100%	04/12	TS
	Yellow Mastic (Yellow)	1%	Glue Binders	100%		
V-101	Floor Tile (Off-White)	99%	Calcite / Vinyl Binders	100%	04/12	TS
	Yellow Mastic (Yellow)	1%	Glue Binders	100%		
V-102	Floor Tile (Off-White)	100%	Calcite / Vinyl Binders	100%	04/12	TS
	Yellow Mastic (Yellow)	<1%	Glue Binders	100%		
V-103	Paint / Texture (Off-White)	100%	Calcite	25%	04/12	TS
			Pigment / Binders	75%		
V-104	Paint / Texture (Off-White)	100%	Calcite	25%	04/12	TS
			Pigment / Binders	75%		
V-105	Paint / Texture (Off-White)	100%	Calcite	25%	04/12	TS
			Pigment / Binders	75%		
V-106	Texture (Brown)	100%	Chrysotile	2%	04/12	TS
			Calcite / Talc / Binders	98%		
V-107	Texture (Brown)	100%	Chrysotile	2%	04/12	TS
			Calcite / Talc / Binders	98%		
V-108	Texture (Brown)	100%	Chrysotile	2%	04/12	TS
			Calcite / Talc / Binders	98%		



18B-04274
188 PLM

BULK ASBESTOS CHAIN OF CUSTODY

LABORATORY INFORMATION		CLIENT INFORMATION	
Moody Labs		Terracon Consultants, Inc.	
2051 Valley View Ln Farmers Branch, Texas 75234		6911 Blanco Road San Antonio, Texas 78216	
Phone: (972) 241-8460	Facsimile: (972) 241-8461	Phone: (210) 641-2112	Facsimile: (210) 641-2124

PROJECT INFORMATION	
Contact Person:	Gabriel Gonzalez
Email Address:	<u>Warren.Dean@Terracon.com</u> / <u>Will.Deveau@Terracon.com</u> / <u>Gabriel.Gonzalez@terracon.com</u>
Project Number:	90187143
Project Name:	Villa Tranchese Fire Protection
Sample Date:	04/05/18
Total Samples:	108
Positive Stop:	Y / <input checked="" type="radio"/> (N) (Circle One)

Collected by:	Gabriel Gonzalez
TDSHS License No.	603052

SAMPLE IDENTIFICATION	REQUESTED ANALYSIS	TURNAROUND TIME				
V-01 - V-108	PLM	Immed	1d	2d	3d	<input checked="" type="radio"/> 5d
(Circle One)						

Released By:	<i>GG</i>	Received By:	<i>Monica Tobar</i> ^{Via} Fed Ex
Date:	<i>4-6-18</i>	Date:	<i>4/9/18</i>
Time:	<i>0805</i>	Time:	<i>855 AM</i>

Terracon



No.	HA No.	HA Type	Comments
01-07	1	DWC	
08-10	2	DWC	
11-13	3	DWC	
14-16	4	SACT	
17-19	5	TSI	
20-22	6	TSI	
23-25	7	DWC	
26-28	8	Plaster	
29-31	9	Mastic	
32-42	10	CMU Texture	
43-53	11	DWC	
54-63	12	DWC	
64-66	13	DWC	
67-69	14	ACT & Mastic	
70-72	15	CMU Texture	
73-75	16	Texture	
76-78	17	SACT	
79-81	18	TSI	
82-84	19	Mastic	
85-87	20	Vibration Dampener	
88-90	21	Mastic	
91-93	22	TSI	
94-96	23	Vibration Dampener	
97-99	24	DWC	
100-102	25	RFT	
103-105	26	CMU Texture	
106-108	27	Caulking	

Released By:	<i>[Signature]</i>	Received By:	Monica Tabor
Date:	4-6-18	Date:	4/9/18 <i>(VIR Red ST)</i>
Time:	0805	Time:	855 AM

APPENDIX D

LEAD-CONTAINING PAINT SAMPLE SUMMARY

APPENDIX D
LEAD-CONTAINING PAINT SAMPLE SUMMARY
FAIR AVENUE APARTMENTS - FIRE PROTECTION IMPROVEMENTS
1215 Fair Avenue, San Antonio, Texas
Terracon Project No. 90177720

SAMPLE NO.	COMBINATION	SUBSTRATE	FUNCTIONAL AREA	SAMPLE LOCATION	LEAD CONTENT
V-L01	Tan	Drywall Construction / CMU	Applied to walls throughout the 1 st Floor Lease Space, Employee Men's Restroom, Main Office 1, Main Office 3, Main Office 4, Laundry Rooms, Custodial Closets, and select units	Lease Space Lobby – West	<49
V-L02	Gray	Drywall Construction	Applied to walls and ceilings in the Employee Women's Restroom, Guest Restroom, and Utility Closet	Guest Men's Restroom	<43
V-L03	White	Drywall Construction	Applied to the walls throughout the 1 st Floor (except Lease Space, Employee Restrooms, Guest Restroom, Utility Closet, Main Office 1, Main Office 3, Main Office 4, Laundry Rooms, Custodial Closets), ceilings in corridors, select units, and Basement Office	Hallway – South	<42
V-L04	Green	Drywall Construction	Applied to lower portion of Main Office Hallway walls (north and south), and columns in Main Lobby	South Hallway – West	<40
V-L05	Blue	Drywall Construction	Applied to the walls in the Exercise Room (east and west)	Exercise Room Northwest	110
V-L06	Yellow	Drywall Construction	Applied to the walls surrounding the elevator (1st Floor)	Elevator – North Wall	<47
V-L07	Purple	Drywall Construction	Applied to the accent walls in select units	Unit 214, Bedroom – Northwest	<40
V-L08	Yellow	Drywall Construction	Applied to the walls in select units	Unit 214, Bedroom – Northwest	<85
V-L09	Black	Drywall Construction	Applied to the Main Office window unit air conditioner protective cages	At Main Offices - South	<38

< = Less Than
ppm = Parts per Million

APPENDIX E

LEAD LABORATORY ANALYTICAL REPORT



Environmental Hazards Services, L.L.C.
 7469 Whitepine Rd
 Richmond, VA 23237
 Telephone: 800.347.4010

Lead Paint Chip Analysis Report

Report Number: 18-04-01082

Client: Terracon - San Antonio
 6911 Blanco Road
 San Antonio, TX 78216

Received Date: 04/09/2018
 Analyzed Date: 04/11/2018
 Reported Date: 04/11/2018

Project/Test Address: Villa Tranchese Fire Protection; 307 Marshall Street; San Antonio, Texas
 Collection Date: 04/04/2018, 04/05/2018

Client Number:
 45-4903

Laboratory Results

Fax Number:
 210-641-2124

Lab Sample Number	Client Sample Number	Collection Location	Pb (ug/g) ppm	% Pb by Wt.	Narrative ID
18-04-01082-001	V-L01		<49	<0.0049	
18-04-01082-002	V-L02		<43	<0.0043	
18-04-01082-003	V-L03		<42	<0.0042	
18-04-01082-004	V-L04		<40	<0.0040	
18-04-01082-005	V-L05		110	0.011	
18-04-01082-006	V-L06		<47	<0.0047	
18-04-01082-007	V-L07		<40	<0.0040	
18-04-01082-008	V-L08		<85	<0.0085	
18-04-01082-009	V-L09		<38	<0.0038	

Environmental Hazards Services, L.L.C

Client Number: 45-4903
 Project/Test Address: Villa Tranchese Fire Protection; 307 Marshall Street;
 San Antonio, Texas

Report Number: 18-04-01082

Lab Sample Number	Client Sample Number	Collection Location	Pb (ug/g) ppm	% Pb by Wt.	Narrative ID
-------------------	----------------------	---------------------	------------------	----------------	--------------

Preparation Method: ASTM E-1979-12
 Analysis Method: EPA SW846 7000B
 Accreditation #: TX T104704248-07TX

Reviewed By Authorized Signatory: *Melissa Kanode*

Missy Kanode
 QA/QC Clerk

The HUD lead guidelines for lead paint chips are 0.50% by Weight, 5000 ppm, or 1.0 mg/cm². The Reporting Limit (RL) for samples prepared by ASTM E-1979-12 is 10.0 ug Total Pb. The RL for samples prepared by EPA SW846 3050B is 25.0 ug Total Pb. Paint chip area and results are calculated based on area measurements determined by the client. All internal quality control requirements associated with this batch were met, unless otherwise noted.

The condition of the samples analyzed was acceptable upon receipt per laboratory protocol unless otherwise noted on this report. Results represent the analysis of samples submitted by the client. Sample location, description, area, etc., was provided by the client. Results reported above in mg/cm³ are calculated based on area supplied by client. This report shall not be reproduced except in full, without the written consent of the Environmental Hazards Service, L.L.C.

ELLAP Accreditation through AIHA-LAP, LLC (100420), NY ELAP #11714.

LEGEND	Pb= lead	ug = microgram	ppm = parts per million
	ug/g = micrograms per gram	Wt. = weight	



Lead Chain-of-Custody

18-04-01082



Due Date:
04/12/2018
(Thursday)
AE

SN

Environmental Hazards Services, LLC

www.leadlab.com 7469 Whitepine Rd
(800) 347-4010 Richmond, VA
(804) 275-4907 (fax) 23237

Company Name: Terracon Consultants, Inc. Address: 6911 Blanco Road City/State/Zip: San Antonio, Texas 78216
 Phone: (210) 714-2086 Fax: (210) 641-2124 E-mail: gagonzalez@terracon.com Acct. Number: 45-4903
 Project Name / Testing Address: Villa Tranchese Fire Protection / 307 Marshall Street City/State (Required): San Antonio, Texas
 Collected by: Gabriel Gonzalez Certification Number: 2071064 Purchase Order Number: 90187143

* Do wipe samples submitted meet ASTM E1792 requirements? Yes No

Turn Around Time (TAT) <input type="checkbox"/> 1-Day <input checked="" type="checkbox"/> 3-Day <input type="checkbox"/> Same Day (Must Call Ahead) <input type="checkbox"/> Weekend (Must Call Ahead) If no TAT is specified, sample(s) will be processed and charged as 3-Day TAT.	Sample Type Single Dust Wipe = DW Soil = S Paint Chip = PC Air = A Composite Soil = CS	Abbreviations FR = Family Room F = Front 0 = Basement LR = Living Room R = Rear KT = Kitchen DN = Den LT = Left BA = Bath DR = Dining Room RT = Right BR = Bedroom 1 = 1st Fl 2 = 2nd Fl	Surface Type for Dust Wipe FL = Floor CP = Carpet SL = Window Sill WW = Window Well
---	--	---	--

No.	Sample Type	Date Collected	Client Sample ID	Collection Location (LR, KT, LTFBR, RTRBR, etc.)	Surface Type	Area			Paint Chip			Air			Comments
						Length X Width in inches (Provide paint chip area only if requesting mg/cm2)	mg/cm ²	PPM	%	Flow Rate (L/min)	Total Time (minutes)	Volume (Total Liters)			
1	PC	04/04/18	V-L01			X									
2	PC	04/04/18	V-L02			X									
3	PC	04/04/18	V-L03			X									
4	PC	04/04/18	V-L04			X									
5	PC	04/04/18	V-L05			X									
6	PC	04/04/18	V-L06			X									
7	PC	04/05/18	V-L07			X									
8	PC	04/05/18	V-L08			X									
9	PC	04/05/18	V-L09			X									
10						X									

Released by: <i>[Signature]</i>	Signature: <i>[Signature]</i>	Date/Time: <i>4-6-18 0905</i>
Received by: <i>[Signature]</i>	Signature: <i>[Signature]</i>	Date/Time: <i>4/9/18 11:30</i>

APPENDIX F

LEAD BASED PAINT XRF ANALYTICAL REPORT



LEAD BASED PAINT XRF ANALYTICAL REPORT

Terracon Consultants, Inc.
San Antonio, Texas

INSPECTION DATE: 04/04/2018 - 04/05/2018

REPORT NUMBER: 90187143

INSTRUMENT TYPE: Heuresis Corp.
Pb200i XRF Lead Paint Analyzer
1570

ACTION LEVEL: 1.0 mg/cm²

STATEMENT: The calibration of the Heuresis Pb200i XRF instrument was done in accordance with the Performance Characteristic Sheet (PCS). The Heuresis Pb200i XRF instrument was calibrated using the paint film nearest 1.0 mg/cm² in the NIST Standard Reference Material (SRM).

LEAD BASED PAINT XRF ANALYTICAL REPORT

Inspection Date: 04/04/2018 - 04/05/2018
 Action Level: 1.0 mg/cm²
 Report Number: 90187143
 Total Readings: 99
 Unit Started: 04/04/2018 15:15:58
 Unit Ended: 04/05/2018 16:52:55

Inspection Site: Villa Tranchese Apartments, Fire
 Protection Improvements
 307 Marshall Street
 San Antonio, Texas 78212

Read #	Result	Substrate	Side	Condition	Color	Calibration	Interior	Exterior	Lead (mg/cm ²)	Mode
1	Negative			Intact		Calibration			0.9 mg/cm ²	Action Level
2	Negative			Intact		Calibration			0.8 mg/cm ²	Action Level
3	Negative			Intact		Calibration			0.9 mg/cm ²	Action Level
4	Negative	Drywall	A	Intact	Tan		Office Space Room #6		0.0 mg/cm ²	Action Level
5	Negative	Drywall	C	Intact	Tan		Office Space Lobby		-0.2 mg/cm ²	Action Level
6	Negative	Drywall	A	Intact	Tan		Office #1		-0.1 mg/cm ²	Action Level
7	Negative	Drywall	D	Intact	Tan		Office #2		-0.3 mg/cm ²	Action Level
8	Negative	Drywall	A	Intact	Tan		Employee Men's Restroom		-0.2 mg/cm ²	Action Level
9	Negative	Drywall	A	Intact	Gray		Employee Women's Restroom		-0.3 mg/cm ²	Action Level
10	Negative	Drywall	D	Intact	Gray		Guest Women's Restroom		-0.3 mg/cm ²	Action Level
11	Negative	Drywall	A	Intact	Gray		Utility Closet		-0.2 mg/cm ²	Action Level
12	Negative	Drywall		Intact	White		Hallway West and South		-0.1 mg/cm ²	Action Level
13	Negative	Drywall		Intact	White		Hallway West and South		-0.2 mg/cm ²	Action Level
14	Negative	Drywall		Intact	White		Hallway West and South		-0.1 mg/cm ²	Action Level
15	Negative	Drywall	B	Intact	White		Recreation Room		-0.1 mg/cm ²	Action Level
16	NULL	Drywall	A	Intact	White		Computer Room		-0.1 mg/cm ²	Action Level
17	Negative	Drywall	A	Intact	White		Computer Room		-0.2 mg/cm ²	Action Level
18	Negative	Drywall	A	Intact	Green		Hallway South		0.1 mg/cm ²	Action Level
19	Negative	Drywall	C	Intact	Green		Hallway South		0.0 mg/cm ²	Action Level
20	Negative	Drywall	B	Intact	Blue		Exercise Room		-0.2 mg/cm ²	Action Level
21	Negative	Drywall	D	Intact	Blue		Exercise Room		-0.3 mg/cm ²	Action Level

LEAD BASED PAINT XRF ANALYTICAL REPORT

Inspection Date: 04/04/2018 - 04/05/2018
 Action Level: 1.0 mg/cm²
 Report Number: 90187143
 Total Readings: 99
 Unit Started: 04/04/2018 15:15:58
 Unit Ended: 04/05/2018 16:52:55

Inspection Site: Villa Tranchese Apartments, Fire
 Protection Improvements
 307 Marshall Street
 San Antonio, Texas 78212

Read #	Result	Substrate	Side	Condition	Color	Calibration	Interior	Exterior	Lead (mg/cm ²)	Mode
22	Negative	Plaster		Intact	Yellow		Elevator Perimeter Walls		0.1 mg/cm ²	Action Level
23	Negative	Plaster		Intact	Yellow		Elevator Perimeter Walls		-0.2 mg/cm ²	Action Level
24	Negative	Plaster		Intact	Yellow		Elevator Perimeter Walls		0.1 mg/cm ²	Action Level
25	Negative	Drywall	C	Intact	Tan		Unit 106 Living Room		-0.2 mg/cm ²	Action Level
26	Negative	Drywall		Intact	White		Unit 106 Living Room		-0.1 mg/cm ²	Action Level
27	Negative			Intact		Calibration			0.9 mg/cm ²	Action Level
28	Positive			Intact		Calibration			1.0 mg/cm ²	Action Level
29	Positive			Intact		Calibration			1.1 mg/cm ²	Action Level
30	Positive			Intact		Calibration			1.1 mg/cm ²	Action Level
31	Positive			Intact		Calibration			1.1 mg/cm ²	Action Level
32	Positive			Intact		Calibration			1.0 mg/cm ²	Action Level
33	Negative	Drywall	D	Intact	Purple		Unit 214 Kitchen		-0.2 mg/cm ²	Action Level
34	Negative	Drywall	D	Intact	Purple		Unit 214 Bedroom		-0.3 mg/cm ²	Action Level
35	Negative	Drywall	C	Intact	Yellow		Unit 214 Bedroom		-0.3 mg/cm ²	Action Level
36	Negative	Cinder Block	C	Intact	Yellow		Unit 214 Kitchen		-0.3 mg/cm ²	Action Level
37	Negative	Cinder Block	C	Intact	White		Unit 312 Kitchen		-0.3 mg/cm ²	Action Level
38	Negative	Cinder Block	D	Intact	White		Unit 312 Living Room		0.0 mg/cm ²	Action Level
39	Negative	Cinder Block	A	Intact	White		Unit 312 Rest Room		-0.1 mg/cm ²	Action Level
40	Negative	Cinder Block	C	Intact	Yellow		Unit 412 Kitchen		-0.6 mg/cm ²	Action Level
41	Negative	Drywall	B	Intact	Purple		Unit 412 Kitchen		-0.1 mg/cm ²	Action Level
42	Negative	Drywall	D	Intact	Yellow		Unit 412 Living Room		-0.2 mg/cm ²	Action Level

LEAD BASED PAINT XRF ANALYTICAL REPORT

Inspection Date: 04/04/2018 - 04/05/2018
 Action Level: 1.0 mg/cm²
 Report Number: 90187143
 Total Readings: 99
 Unit Started: 04/04/2018 15:15:58
 Unit Ended: 04/05/2018 16:52:55

Inspection Site: Villa Tranchese Apartments, Fire
 Protection Improvements
 307 Marshall Street
 San Antonio, Texas 78212

Read #	Result	Substrate	Side	Condition	Color	Calibration	Interior	Exterior	Lead (mg/cm ²)	Mode
43	Negative	Drywall	B	Intact	Purple		Unit 412 Bed Room		-0.1 mg/cm ²	Action Level
44	Negative	Drywall		Intact	White		Unit 412 Rest Room Ceiling		-0.2 mg/cm ²	Action Level
45	Negative	Cinder Block	A	Intact	Tan		Unit 613 Kitchen		-0.2 mg/cm ²	Action Level
46	Negative	Cinder Block	B	Intact	Tan		Unit 613 Living Room		-0.3 mg/cm ²	Action Level
47	Negative	Drywall	D	Intact	Tan		Unit 613 Bed Room		-0.2 mg/cm ²	Action Level
48	Negative	Drywall		Intact	White		Unit 613 Rest Room		-0.1 mg/cm ²	Action Level
49	Negative	Concrete		Intact	White		Unit 613 Living Room Ceiling		0.0 mg/cm ²	Action Level
50	Negative	Cinder Block	B	Intact	Yellow		Unit 710 Living Room		-0.3 mg/cm ²	Action Level
51	Negative	Drywall	D	Intact	Yellow		Unit 710 Living Room		-0.2 mg/cm ²	Action Level
52	Negative	Drywall	D	Intact	Purple		Unit 710 Kitchen		-0.2 mg/cm ²	Action Level
53	Negative	Drywall	D	Intact	Purple		Unit 710 Bed Room		-0.2 mg/cm ²	Action Level
54	Negative	Drywall		Intact	White		Unit 710 Rest Room Ceiling		0.0 mg/cm ²	Action Level
55	Negative	Drywall		Intact	White		Unit 807 Rest Room Ceiling		-0.1 mg/cm ²	Action Level
56	Negative	Concrete		Intact	White		Unit 807 Living Room Ceiling		0.1 mg/cm ²	Action Level
57	Negative	Cinder Block	D	Intact	Tan		Unit 807 Living Room		-0.4 mg/cm ²	Action Level
58	Negative	Drywall	B	Intact	Tan		Unit 807 Living Room		-0.2 mg/cm ²	Action Level
59	Negative	Cinder Block	A	Intact	Tan		Unit 807 Kitchen		-0.2 mg/cm ²	Action Level
60	Negative	Drywall	B	Intact	Tan		Unit 901 Kitchen		-0.1 mg/cm ²	Action Level
61	Negative	Cinder Block	D	Intact	Tan		Unit 901 Living Room		-0.3 mg/cm ²	Action Level

LEAD BASED PAINT XRF ANALYTICAL REPORT

Inspection Date: 04/04/2018 - 04/05/2018
 Action Level: 1.0 mg/cm²
 Report Number: 90187143
 Total Readings: 99
 Unit Started: 04/04/2018 15:15:58
 Unit Ended: 04/05/2018 16:52:55

Inspection Site: Villa Tranchese Apartments, Fire
 Protection Improvements
 307 Marshall Street
 San Antonio, Texas 78212

Read #	Result	Substrate	Side	Condition	Color	Calibration	Interior	Exterior	Lead (mg/cm ²)	Mode
62	Negative	Cinder Block	D	Intact	Tan		Unit 901 Bed Room		0.1 mg/cm ²	Action Level
63	Negative	Drywall		Intact	White		Unit 901 Rest Room Ceiling		-0.1 mg/cm ²	Action Level
64	Negative	Concrete		Intact	White		Unit 901 Living Room Ceiling		0.0 mg/cm ²	Action Level
65	Negative	Cinder Block	B	Intact	Yellow		Unit 1010 Living Room		-0.2 mg/cm ²	Action Level
66	Negative	Drywall	D	Intact	Yellow		Unit 1010 Living Room		-0.2 mg/cm ²	Action Level
67	Negative	Drywall	D	Intact	Purple		Unit 1010 Bed Room		-0.2 mg/cm ²	Action Level
68	Negative	Drywall	D	Intact	Purple		Unit 1010 Kitchen		-0.3 mg/cm ²	Action Level
69	Negative	Drywall		Intact	White		Unit 1010 Rest Room Ceiling		-0.1 mg/cm ²	Action Level
70	Negative	Drywall		Intact	White		Unit 1110 Rest Room Ceiling		-0.2 mg/cm ²	Action Level
71	Negative	Cinder Block	B	Intact	White		Unit 1110 Living Room		-0.4 mg/cm ²	Action Level
72	Negative	Drywall	D	Intact	White		Unit 1110 Living Room		-0.3 mg/cm ²	Action Level
73	Negative	Drywall	D	Intact	White		Unit 1110 Kitchen		-0.1 mg/cm ²	Action Level
74	Negative	Cinder Block	A	Intact	Tan		Floor 11 Laundry Room		-0.3 mg/cm ²	Action Level
75	Negative	Concrete	A	Intact	Tan		Floor 11 Laundry Room Ceiling		-0.1 mg/cm ²	Action Level
76	Negative	Concrete		Intact	White		Floor 11 Corridor Ceiling		0.1 mg/cm ²	Action Level
77	Negative	Concrete		Intact	White		Floor 7 Corridor Ceiling		0.1 mg/cm ²	Action Level
78	Negative	Concrete		Intact	Tan		Floor 7 Laundry Room Ceiling		0.2 mg/cm ²	Action Level
79	Negative	Cinder Block	A	Intact	Tan		Floor 7 Laundry Room		-0.2 mg/cm ²	Action Level
80	Negative	Drywall	D	Intact	White		Unit 504 Living Room		-0.2 mg/cm ²	Action Level

LEAD BASED PAINT XRF ANALYTICAL REPORT

Inspection Date: 04/04/2018 - 04/05/2018
 Action Level: 1.0 mg/cm²
 Report Number: 90187143
 Total Readings: 99
 Unit Started: 04/04/2018 15:15:58
 Unit Ended: 04/05/2018 16:52:55

Inspection Site: Villa Tranchese Apartments, Fire
 Protection Improvements
 307 Marshall Street
 San Antonio, Texas 78212

Read #	Result	Substrate	Side	Condition	Color	Calibration	Interior	Exterior	Lead (mg/cm ²)	Mode
81	Negative	Drywall	B	Intact	White		Unit 504 Bed Room		-0.1 mg/cm ²	Action Level
82	Negative	Drywall		Intact	White		Unit 504 Rest Room Ceiling		-0.2 mg/cm ²	Action Level
83	Negative	Cinder Block	C	Intact	White		Unit 504 Kitchen		-0.4 mg/cm ²	Action Level
84	Negative	Concrete		Intact	White		Floor 3 Corridor Ceiling		0.0 mg/cm ²	Action Level
85	Negative	Concrete		Intact	Tan		Floor 3 Laundry Room Ceiling		0.1 mg/cm ²	Action Level
86	Negative	Cinder Block	A	Intact	Tan		Floor 3 Laundry Room		-0.1 mg/cm ²	Action Level
87	Positive			Intact		Calibration			1.0 mg/cm ²	Action Level
88	Negative			Intact		Calibration			0.9 mg/cm ²	Action Level
89	Positive			Intact		Calibration			1.1 mg/cm ²	Action Level
90	Positive			Intact		Calibration			1.0 mg/cm ²	Action Level
91	Negative			Intact		Calibration			0.9 mg/cm ²	Action Level
92	Positive			Intact		Calibration			1.0 mg/cm ²	Action Level
93	Negative	Metal		Intact	Black			A/C Security Cage	-0.1 mg/cm ²	Action Level
94	Negative	Metal		Intact	Black			A/C Security Cage	0.0 mg/cm ²	Action Level
95	Negative	Metal		Intact	Black			A/C Security Cage	0.0 mg/cm ²	Action Level
96	Negative	Metal		Intact	Black			A/C Security Cage	-0.1 mg/cm ²	Action Level
97	Positive			Intact		Calibration			1.1 mg/cm ²	Action Level
98	Positive			Intact		Calibration			1.0 mg/cm ²	Action Level
99	Positive			Intact		Calibration			1.1 mg/cm ²	Action Level

----- END OF READINGS -----

APPENDIX G

XRF PERFORMANCE CHARACTERISTIC SHEET

Performance Characteristic Sheet

EFFECTIVE DATE: December 1, 2015

MANUFACTURER AND MODEL:

Make: *Heuresis*
Models: *Model Pb200i*
Source: *⁵⁷Co, 5 mCi (nominal – new source)*

FIELD OPERATION GUIDANCE

OPERATING PARAMETERS:

Action Level mode

XRF CALIBRATION CHECK LIMITS:

0.8 to 1.2 mg/cm ² (inclusive)

SUBSTRATE CORRECTION:

Not applicable

INCONCLUSIVE RANGE OR THRESHOLD:

ACTION LEVEL MODE READING DESCRIPTION	SUBSTRATE	THRESHOLD (mg/cm²)
Results not corrected for substrate bias on any substrate	Brick	1.0
	Concrete	1.0
	Drywall	1.0
	Metal	1.0
	Plaster	1.0
	Wood	1.0

BACKGROUND INFORMATION

EVALUATION DATA SOURCE AND DATE:

This sheet is supplemental information to be used in conjunction with Chapter 7 of the HUD *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing* ("HUD Guidelines"). Performance parameters shown on this sheet are calculated using test results on building components in the HUD archive. Testing was conducted on 146 test samples in November 2015, with two separate instruments running software version 2.1-2 in Action Level test mode. The actual source strength of each instrument on the day of testing was approximately 2.0 mCi; source ages were approximately one year.

OPERATING PARAMETERS

Performance parameters shown in this sheet are applicable only when properly operating the instrument using the manufacturer's instructions and procedures described in Chapter 7 of the HUD Guidelines.

XRF CALIBRATION CHECK:

The calibration of the XRF instrument should be checked using the paint film nearest 1.0 mg/cm² in the NIST Standard Reference Material (SRM) used (e.g., for NIST SRM 2579, use the 1.02 mg/cm² film).

If the average (rounded to 1 decimal place) of three readings is outside the acceptable calibration check range, follow the manufacturer's instructions to bring the instrument into control before XRF testing proceeds.

SUBSTRATE CORRECTION VALUE COMPUTATION:

Chapter 7 of the HUD Guidelines provides guidance on correcting XRF results for substrate bias. Supplemental guidance for using the paint film nearest 1.0 mg/cm² for substrate correction is provided:

XRF results are corrected for substrate bias by subtracting from each XRF result a correction value determined separately in each house for single-family housing or in each development for multifamily housing, for each substrate. The correction value is an average of XRF readings taken over the NIST SRM paint film nearest to 1.0 mg/cm² at test locations that have been scraped bare of their paint covering. Compute the correction values as follows:

Using the same XRF instrument, take three readings on a bare substrate area covered with the NIST SRM paint film nearest 1 mg/cm². Repeat this procedure by taking three more readings on a second bare substrate area of the same substrate covered with the NIST SRM.

Compute the correction value for each substrate type where XRF readings indicate substrate correction is needed by computing the average of all six readings as shown below.

For each substrate type (the 1.02 mg/cm² NIST SRM is shown in this example; use the actual lead loading of the NIST SRM used for substrate correction):

$$\text{Correction value} = (1\text{st} + 2\text{nd} + 3\text{rd} + 4\text{th} + 5\text{th} + 6\text{th Reading})/6 - 1.02 \text{ mg/cm}^2$$

Repeat this procedure for each substrate requiring substrate correction in the house or housing development.

EVALUATING THE QUALITY OF XRF TESTING:

Randomly select ten testing combinations for retesting from each house or from two randomly selected units in multifamily housing.

Conduct XRF re-testing at the ten testing combinations selected for retesting.

Determine if the XRF testing in the units or house passed or failed the test by applying the steps below. Compute the Retest Tolerance Limit by the following steps:

Determine XRF results for the original and retest XRF readings. Do not correct the original or retest results for substrate bias. In single-family and multi-family housing, a result is defined as a single reading. Therefore, there will be ten original and ten retest XRF results for each house or for the two selected units.

Calculate the average of the original XRF result and the retest XRF result for each testing combination.

Square the average for each testing combination.

Add the ten squared averages together. Call this quantity C.

Multiply the number C by 0.0072. Call this quantity D.

Add the number 0.032 to D. Call this quantity E.

Take the square root of E. Call this quantity F.

Multiply F by 1.645. The result is the Retest Tolerance Limit.

Compute the average of all ten original XRF readings.

Compute the average of all ten re-test XRF readings.

Find the absolute difference of the two averages.

If the difference is less than the Retest Tolerance Limit, the inspection has passed the retest. If the difference of the overall averages equals or exceeds the Retest Tolerance Limit, this procedure should be repeated with ten new testing combinations. If the difference of the overall averages is equal to or greater than the Retest Tolerance Limit a second time, then the inspection should be considered deficient.

Use of this procedure is estimated to produce a spurious result approximately 1% of the time. That is, results of this procedure will call for further examination when no examination is warranted in approximately 1 out of 100 dwelling units tested.

TESTING TIMES:

In the Action Level paint test mode, the instrument takes the longest time to complete readings close to the Federal standard of 1.0 mg/cm². The table below shows the mean and standard deviation of actual reading times by reading level for paint samples during the November 2015 archive testing. The tested instruments reported readings to one decimal place. No significant differences in reading times by substrate were observed. These times apply only to instruments with the same source strength as those tested (2.0 mCi). Instruments with stronger sources will have shorter reading times and those with weaker sources, longer reading times, than those in the table.

Mean and Standard Deviation of Reading Times in Action Level Mode by Reading Level		
Reading (mg/cm²)	Mean Reading Time (seconds)	Standard Deviation (seconds)
< 0.7	3.48	0.47
0.7	7.29	1.92
0.8	13.95	1.78
0.9 – 1.2	15.25	0.66
1.3 – 1.4	6.08	2.50
≥ 1.5	3.32	0.05

CLASSIFICATION OF RESULTS:

XRF results are classified as **positive** if they are **greater than or equal** to the stated threshold for the instrument (1.0 mg/cm²), and *negative* if they are *less than* the threshold.

DOCUMENTATION:

A report titled *Methodology for XRF Performance Characteristic Sheets* (EPA 747-R-95-008) provides an explanation of the statistical methodology used to construct the data in the sheets, and provides empirical results from using the recommended inconclusive ranges or thresholds for specific XRF instruments. The report may be downloaded at <http://www2.epa.gov/lead/methodology-xrf-performance-characteristic-sheets-epa-747-r-95-008-september-1997>.

This XRF Performance Characteristic Sheet (PCS) was developed by QuanTech, Inc., under a contract with the XRF manufacturer.

APPENDIX H

LICENSES AND CERTIFICATIONS



TEXAS DEPARTMENT OF STATE HEALTH SERVICES

TERRACON CONSULTANTS INC

is certified to perform as a

Asbestos Consultant Agency

in the State of Texas within the purview of Texas Occupations Code, chapter 1954, so long as this license is not suspended or revoked and is renewed according to the rules adopted by the Texas Board of Health.

A handwritten signature in black ink, appearing to read "John Hellerstedt".

JOHN HELLERSTEDT, M.D.
COMMISSIONER OF HEALTH

License Number: 100157

Control Number: 96944

Expiration Date: 11/30/2018

(Void After Expiration Date)

VOID IF ALTERED NON-TRANSFERABLE



TEXAS DEPARTMENT OF STATE HEALTH SERVICES

Be it known that

TERRACON CONSULTANTS INC

is certified to perform as a

Lead Firm

in the State of Texas and is hereby governed by the rights, privileges and responsibilities set forth in Texas Occupations Code, Chapter 1955 and Title 25, Texas Administrative Code, Chapter 295 relating to Texas Environmental Lead Reduction, as long as this license is not suspended or revoked.

A handwritten signature in black ink, appearing to read "John Hellerstedt".

*John Hellerstedt, M.D.
Commissioner of Health*

License Number: 2110106

Control Number: 6976

Expiration Date: 3/20/2020

(Void After Expiration Date)

VOID IF ALTERED NON-TRANSFERABLE

SEE BACK



**Texas Department of State
Health Services**

Asbestos Inspector

GABRIEL A GONZALEZ

License No. 603052

Control No. 98403

Expiration Date: 10/7/2018





Health Services

Asbestos Inspector

WARREN P DEAN

License No. 603403

Control No. 98486

Expiration Date: 2/23/2019





**Texas Department of
State Health Services**

Asbestos Individual Consultant

RICHARD I HOWES

License No. 105406

Control No. 97017

Expiration Date: 3/21/2018





TEXAS DEPARTMENT OF STATE HEALTH SERVICES

Be it known that

GABRIEL A GONZALEZ

is certified to perform as a

Lead Risk Assessor

in the State of Texas and is hereby governed by the rights, privileges and responsibilities set forth in Texas Occupations Code, Chapter 1955 and Title 25, Texas Administrative Code, Chapter 295 relating to Texas Environmental Lead Reduction, as long as this license is not suspended or revoked.

A handwritten signature in cursive script, appearing to read "John Hellerstedt".

John Hellerstedt, M.D.
Commissioner of Health

License Number: 2071064

Expiration Date: 5/26/2018

VOID IF ALTERED

Control Number 7236

NON-TRANSFERABLE



TEXAS DEPARTMENT OF STATE HEALTH SERVICES

Be it known that

WARREN P DEAN

is certified to perform as a

Lead Risk Assessor

in the State of Texas and is hereby governed by the rights, privileges and responsibilities set forth in Texas Occupations Code, Chapter 1955 and Title 25, Texas Administrative Code, Chapter 295 relating to Texas Environmental Lead Reduction, as long as this license is not suspended or revoked.

A handwritten signature in black ink, appearing to read "John Hellerstedt".

John Hellerstedt, M.D.
Commissioner of Health

License Number: 2071063

Expiration Date: 4/28/2020

Void After Expiration Date

VOID IF ALTERED

Control Number: 7448

NON-TRANSFERABLE



TEXAS DEPARTMENT OF STATE HEALTH SERVICES

Be it known that

RICHARD I HOWES

is certified to perform as a

Lead Abatement Project Designer

in the State of Texas and is hereby governed by the rights, privileges and responsibilities set forth in Texas Occupations Code, Chapter 1955 and Title 25, Texas Administrative Code, Chapter 295 relating to Texas Environmental Lead Reduction, as long as this license is not suspended or revoked.

A handwritten signature in black ink, appearing to read "John Hellerstedt".

John Hellerstedt, M.D.
Commissioner of Health

License Number: 2090034

Expiration Date: 11/19/2019

Void After Expiration Date

VOID IF ALTERED

Control Number 6055

NON-TRANSFERABLE



Texas Commission on Environmental Quality

NELAP-Recognized Laboratory Accreditation is hereby awarded to



Environmental Hazards Services, LLC

7469 Whitepine Road
North Chesterfield, VA 23237-2261

in accordance with Texas Water Code Chapter 5, Subchapter R, Title 30 Texas Administrative Code Chapter 25, and the National Environmental Laboratory Accreditation Program.

The laboratory's scope of accreditation includes the fields of accreditation that accompany this certificate. Continued accreditation depends upon successful ongoing participation in the program. The Texas Commission on Environmental Quality urges customers to verify the laboratory's current location(s) and accreditation status for particular methods and analyses (www.tceq.texas.gov/goto/lab). Accreditation does not imply that a product, process, system or person is approved by the Texas Commission on Environmental Quality.

Certificate Number: T104704248-17-9

Effective Date: 1/1/2018

Expiration Date: 12/31/2018

A handwritten signature in black ink, appearing to read "R. Q. A. Hyde".

Executive Director Texas Commission on
Environmental Quality



Texas Commission on Environmental Quality



NELAP - Recognized Laboratory Fields of Accreditation

Environmental Hazards Services, LLC
7469 Whitepine Road
North Chesterfield, VA 23237-2261

Certificate: T104704248-17-9
Expiration Date: 12/31/2018
Issue Date: 1/1/2018

These fields of accreditation supercede all previous fields. The Texas Commission on Environmental Quality urges customers to verify the laboratory's current accreditation status for particular methods and analyses.

Matrix: Solid & Chemical Materials

Method EPA 1311

Analyte	AB	Analyte ID	Method ID
TCLP	VA	849	10118806

Method EPA 6010

Analyte	AB	Analyte ID	Method ID
Aluminum	VA	1000	10155609
Antimony	VA	1005	10155609
Arsenic	VA	1010	10155609
Barium	VA	1015	10155609
Beryllium	VA	1020	10155609
Cadmium	VA	1030	10155609
Chromium	VA	1040	10155609
Cobalt	VA	1050	10155609
Copper	VA	1055	10155609
Iron	VA	1070	10155609
Lead	VA	1075	10155609
Magnesium	VA	1085	10155609
Manganese	VA	1090	10155609
Molybdenum	VA	1100	10155609
Selenium	VA	1140	10155609
Silver	VA	1150	10155609
Thallium	VA	1165	10155609
Titanium	VA	1180	10155609
Vanadium	VA	1185	10155609
Zinc	VA	1190	10155609

Method EPA 7471

Analyte	AB	Analyte ID	Method ID
Mercury	VA	1095	10166208



AIHA Laboratory Accreditation Programs, LLC

acknowledges that

Environmental Hazards Services, LLC

7469 White Pine Road, Richmond, VA 23237

Laboratory ID: 100420

along with all premises from which key activities are performed, as listed above, has fulfilled the requirements of the AIHA Laboratory Accreditation Programs (AIHA-LAP), LLC accreditation to the ISO/IEC 17025:2005 international standard, *General Requirements for the Competence of Testing and Calibration Laboratories* in the following:

LABORATORY ACCREDITATION PROGRAMS

- | | |
|--|-------------------------------------|
| <input checked="" type="checkbox"/> INDUSTRIAL HYGIENE | Accreditation Expires: May 01, 2018 |
| <input checked="" type="checkbox"/> ENVIRONMENTAL LEAD | Accreditation Expires: May 01, 2018 |
| <input checked="" type="checkbox"/> ENVIRONMENTAL MICROBIOLOGY | Accreditation Expires: May 01, 2018 |
| <input type="checkbox"/> FOOD | Accreditation Expires: |
| <input type="checkbox"/> UNIQUE SCOPES | Accreditation Expires: |

Specific Field(s) of Testing (FoT)/Method(s) within each Accreditation Program for which the above named laboratory maintains accreditation is outlined on the attached **Scope of Accreditation**. Continued accreditation is contingent upon successful on-going compliance with ISO/IEC 17025:2005 and AIHA-LAP, LLC requirements. This certificate is not valid without the attached **Scope of Accreditation**. Please review the AIHA-LAP, LLC website (www.aihaaccreditedlabs.org) for the most current Scope.

Gerald Schultz, CIH
Chairperson, Analytical Accreditation Board

Cheryl O. Morton
Managing Director, AIHA Laboratory Accreditation Programs, LLC

Revision 14: 03/26/2014

Date Issued: 02/29/2016



TEXAS DEPARTMENT OF STATE HEALTH SERVICES

STEVE MOODY MICRO SERVICES LLC

is certified to perform as a

**Asbestos Laboratory
PCM, PLM, TEM**

in the State of Texas within the purview of Texas Occupations Code, chapter 1954, so long as this license is not suspended or revoked and is renewed according to the rules adopted by the Texas Board of Health.

A handwritten signature in black ink, appearing to read "John Hellerstedt".

JOHN HELLERSTEDT, M.D.
COMMISSIONER OF HEALTH

License Number: 300084

Control Number: 96126

Expiration Date: 5/31/2018

(Void After Expiration Date)

VOID IF ALTERED NON-TRANSFERABLE

United States Department of Commerce
National Institute of Standards and Technology



Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 102056-0

Steve Moody Micro Services, LLC
Farmers Branch, TX

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,
listed on the Scope of Accreditation, for:*

Asbestos Fiber Analysis

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).*

2017-07-01 through 2018-06-30

Effective Dates



For the National Voluntary Laboratory Accreditation Program

A handwritten signature in blue ink, reading "Tara S. Laman", is written over a horizontal line. The signature is cursive and stylized.



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

Steve Moody Micro Services, LLC

2051 Valley View Lane

Farmers Branch, TX 75234-8956

Mr. Bruce Crabb

Phone: 972-241-8460 Fax: 972-241-8461

Email: bruce.crabb@moodylabs.com

<http://www.moodylabs.com>

ASBESTOS FIBER ANALYSIS

NVLAP LAB CODE 102056-0

Bulk Asbestos Analysis

Code

Description

18/A01

EPA -- Appendix E to Subpart E of Part 763 -- Interim Method of the Determination of Asbestos in Bulk Insulation Samples

18/A03

EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

Airborne Asbestos Analysis

Code

Description

18/A02

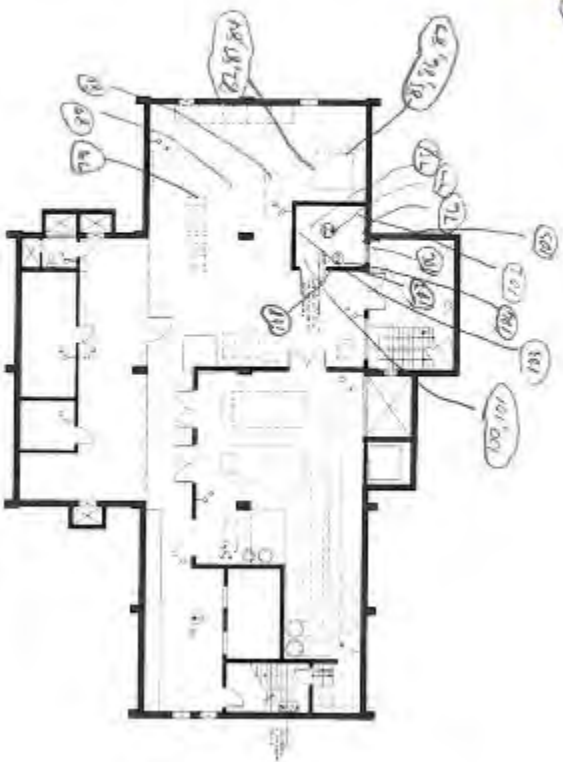
U.S. EPA's "Interim Transmission Electron Microscopy Analytical Methods-Mandatory and Nonmandatory-and Mandatory Section to Determine Completion of Response Actions" as found in 40 CFR, Part 763, Subpart E, Appendix A.

A handwritten signature in black ink, appearing to read "Dana S. Laman".

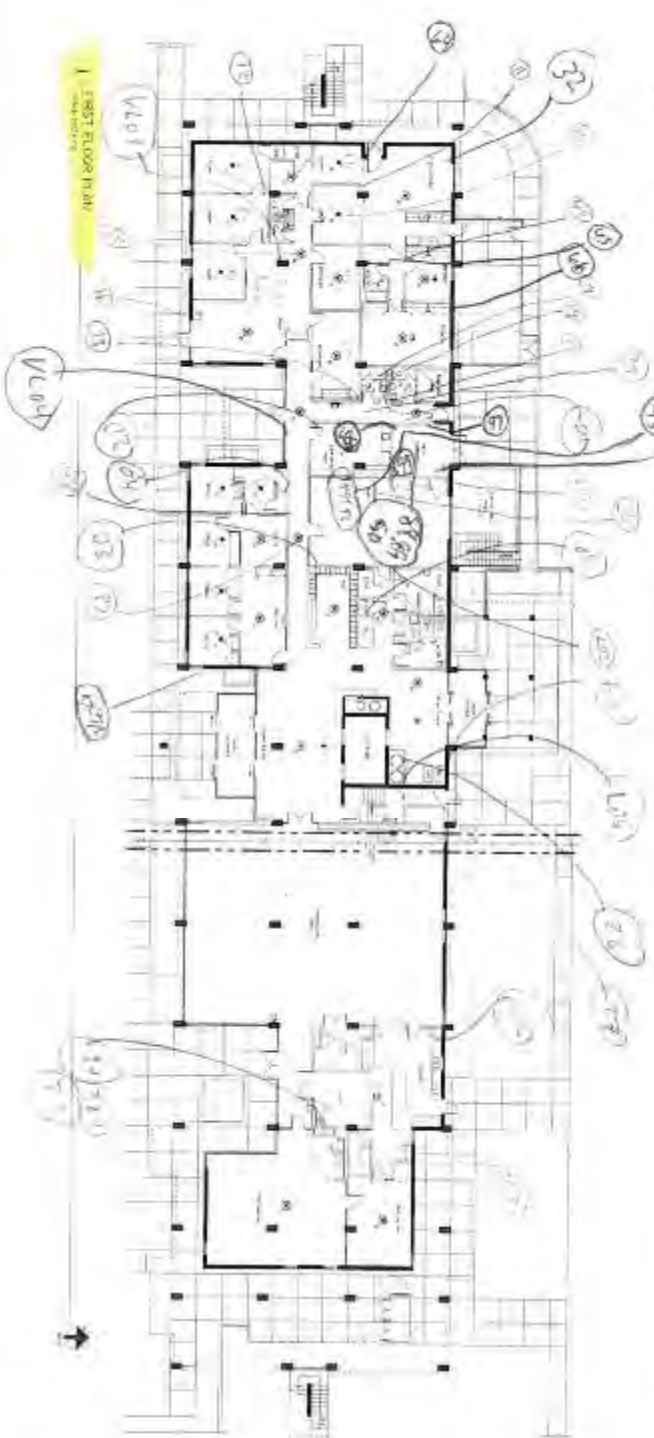
For the National Voluntary Laboratory Accreditation Program

APPENDIX I
SAMPLE LOCATION MAPS

1



2. BASEMENT PLAN



1. FIRST FLOOR PLAN

INSTALLATION NOTES

1. All work shall be installed in accordance with the manufacturer's instructions and applicable codes.
2. All equipment shall be installed in accordance with the manufacturer's instructions and applicable codes.
3. All equipment shall be installed in accordance with the manufacturer's instructions and applicable codes.
4. All equipment shall be installed in accordance with the manufacturer's instructions and applicable codes.
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19. All equipment shall be installed in accordance with the manufacturer's instructions and applicable codes.
20. All equipment shall be installed in accordance with the manufacturer's instructions and applicable codes.

SYMBOL	DESCRIPTION
(Symbol)	Structural Steel
(Symbol)	Concrete
(Symbol)	Masonry
(Symbol)	Wood
(Symbol)	Other

90% REVIEW SET
NOT FOR CONSTRUCTION

FA 200

SHEET NO.

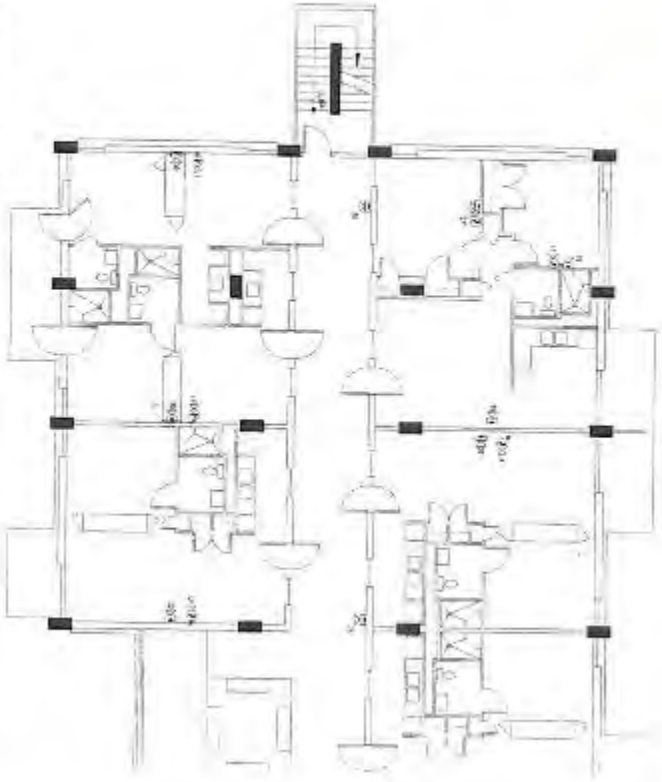
San Antonio Housing Authority
HVAC, Fire Protection Systems & Life Safety Renovations
Villa Tranchese Apartments
 301 Marskal Street
 San Antonio, Texas

KISTNER

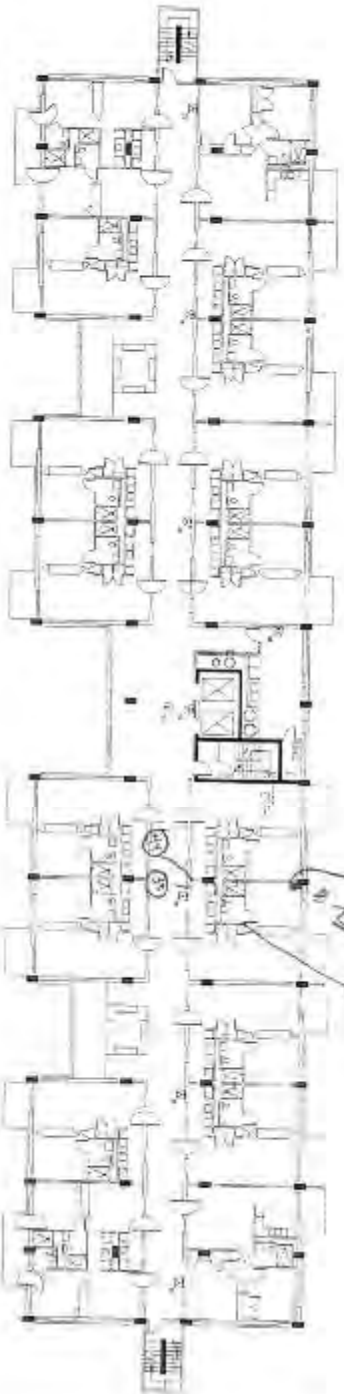
ARCHITECTS

1001 MARSHAL STREET
 SAN ANTONIO, TEXAS 78204
 210.207.0000
 210.207.0000
 www.kistner.com

2



2 ENLARGED UNIT MAIN VIEW



1 PLAN LEVEL & THRU II

INSTALLATION NOTES

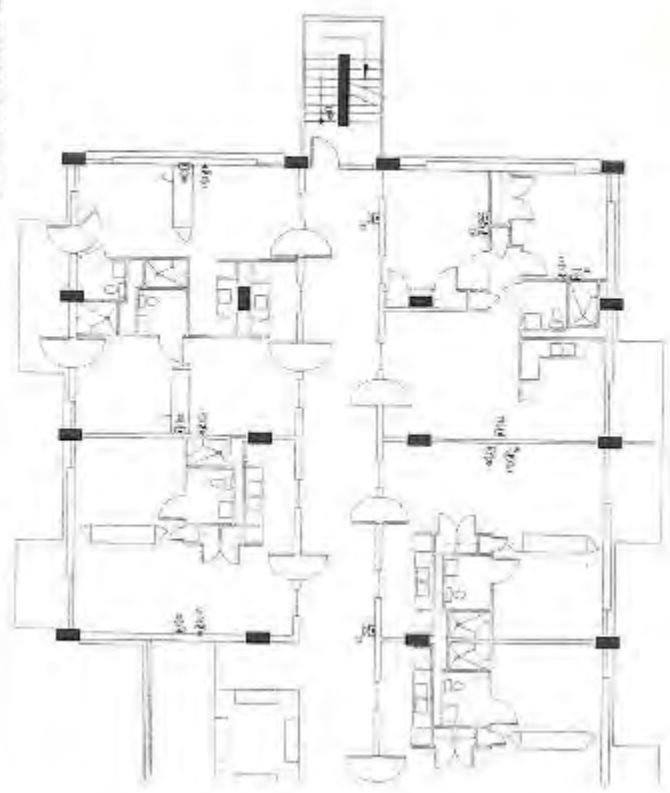
1. All work shall be done in accordance with the applicable codes and standards.
2. All materials shall be of the highest quality and shall be approved by the authority having jurisdiction.
3. All work shall be done in accordance with the applicable codes and standards.
4. All work shall be done in accordance with the applicable codes and standards.
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- Legend:
- 1. [Symbol] [Description]
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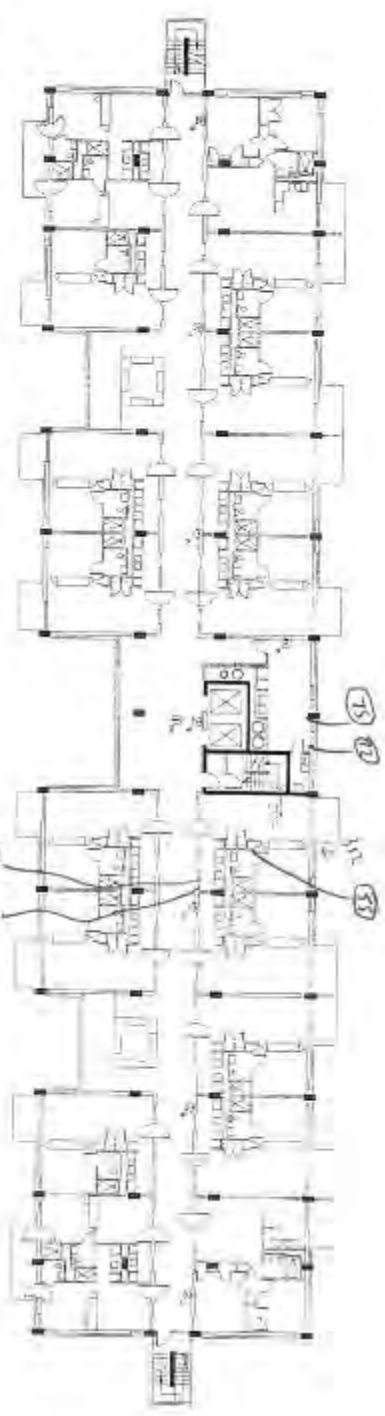
90% REVIEW SET
NOT FOR CONSTRUCTION

<p>KISTNER MECHANICAL CONTRACTORS 1800 S. W. 10th St. Miami, FL 33135 Phone: 305-255-1111 Fax: 305-255-1112</p>	<p>FCPG FLOOR COVERING PRODUCTS GROUP 10000 W. 11th St. Miami, FL 33176 Phone: 305-555-1111 Fax: 305-555-1112</p>	<p>San Antonio Housing Authority HVAC, Fire Protection Systems & Life Safety Renovations Villa Tranchese Apartments 112 Metro Plaza San Antonio, Texas</p>	<p>PROJECT NO. [Blank]</p> <p>DATE: [Blank]</p> <p>SCALE: [Blank]</p> <p>BY: [Blank]</p> <p>CHECKED BY: [Blank]</p> <p>APPROVED BY: [Blank]</p>
			<p>SHEET NO. [Blank]</p> <p>FA 201</p>

3



2. ENLARGED JAMB PLAN VIEW



1. P. 241 LEVEL 2 JAMB PLAN

DETAIL NOTES

1. All work shall be in accordance with the applicable provisions of the International Building Code, the International Residential Code, and the applicable provisions of the City of San Antonio.
2. All work shall be in accordance with the applicable provisions of the International Building Code, the International Residential Code, and the applicable provisions of the City of San Antonio.
3. All work shall be in accordance with the applicable provisions of the International Building Code, the International Residential Code, and the applicable provisions of the City of San Antonio.
4. All work shall be in accordance with the applicable provisions of the International Building Code, the International Residential Code, and the applicable provisions of the City of San Antonio.
5. All work shall be in accordance with the applicable provisions of the International Building Code, the International Residential Code, and the applicable provisions of the City of San Antonio.
6. All work shall be in accordance with the applicable provisions of the International Building Code, the International Residential Code, and the applicable provisions of the City of San Antonio.
7. All work shall be in accordance with the applicable provisions of the International Building Code, the International Residential Code, and the applicable provisions of the City of San Antonio.
8. All work shall be in accordance with the applicable provisions of the International Building Code, the International Residential Code, and the applicable provisions of the City of San Antonio.
9. All work shall be in accordance with the applicable provisions of the International Building Code, the International Residential Code, and the applicable provisions of the City of San Antonio.
10. All work shall be in accordance with the applicable provisions of the International Building Code, the International Residential Code, and the applicable provisions of the City of San Antonio.

SYMBOLS

- 1. 1/4" = 1'-0" Scale
- 2. 1/4" = 1'-0" Scale
- 3. 1/4" = 1'-0" Scale
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- 16. 1/4" = 1'-0" Scale
- 17. 1/4" = 1'-0" Scale
- 18. 1/4" = 1'-0" Scale
- 19. 1/4" = 1'-0" Scale
- 20. 1/4" = 1'-0" Scale

90% REVIEW SET
NOT FOR CONSTRUCTION

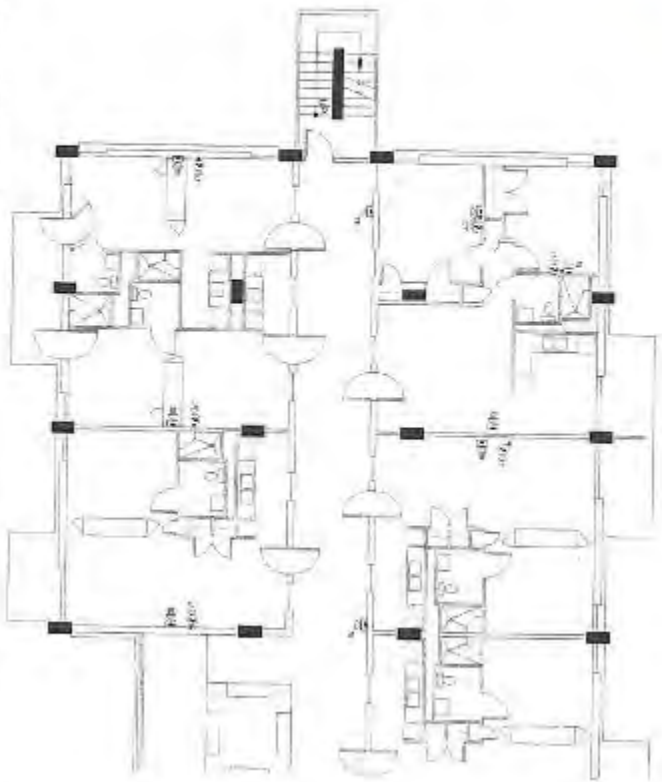
<p>KISTNER Architects</p> <p>12001 North Loop West Suite 1000 Houston, Texas 77028 Tel: 281.462.2200 Fax: 281.462.2201 www.kistner.com</p>	<p>FPCG FPCG CONSULTANTS</p>	<p>San Antonio Housing Authority HVAC, Fire Protection Systems & Life Safety Renovations Villa Tranchese Apartments 307 Marshall Street San Antonio, Texas</p>	<p>PROJECT</p> <p>San Antonio Housing Authority HVAC, Fire Protection Systems & Life Safety Renovations Villa Tranchese Apartments 307 Marshall Street San Antonio, Texas</p>
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FA 201
SHEET NO.

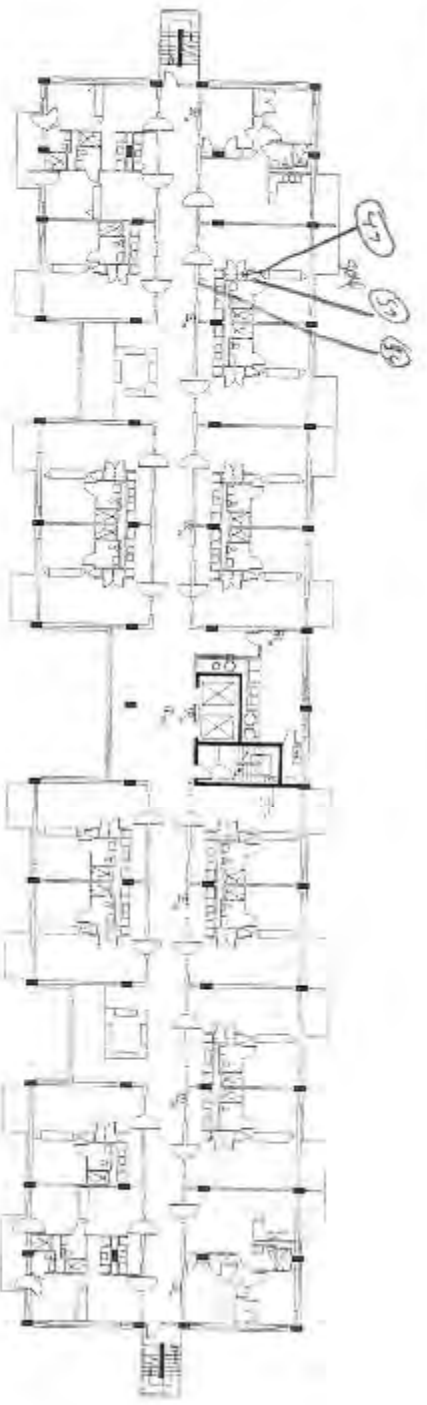


NOTALATION NOTES

- 1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF SAN ANTONIO'S BUILDING CODE AND ALL APPLICABLE ORDINANCES.
- 2. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF SAN ANTONIO'S ELECTRICAL CODE AND ALL APPLICABLE ORDINANCES.
- 3. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF SAN ANTONIO'S MECHANICAL CODE AND ALL APPLICABLE ORDINANCES.
- 4. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF SAN ANTONIO'S PLUMBING CODE AND ALL APPLICABLE ORDINANCES.
- 5. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF SAN ANTONIO'S FIRE CODE AND ALL APPLICABLE ORDINANCES.
- 6. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF SAN ANTONIO'S LIFE SAFETY CODE AND ALL APPLICABLE ORDINANCES.
- 7. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF SAN ANTONIO'S ENVIRONMENTAL CODE AND ALL APPLICABLE ORDINANCES.
- 8. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF SAN ANTONIO'S HEALTH AND SAFETY CODE AND ALL APPLICABLE ORDINANCES.
- 9. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF SAN ANTONIO'S PUBLIC WORKS CODE AND ALL APPLICABLE ORDINANCES.
- 10. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF SAN ANTONIO'S UTILITIES CODE AND ALL APPLICABLE ORDINANCES.
- 11. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF SAN ANTONIO'S ZONING CODE AND ALL APPLICABLE ORDINANCES.
- 12. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF SAN ANTONIO'S GENERAL ORDINANCES AND ALL APPLICABLE ORDINANCES.
- 13. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF SAN ANTONIO'S SUBORDINATING ORDINANCES AND ALL APPLICABLE ORDINANCES.
- 14. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF SAN ANTONIO'S SUPPLEMENTARY ORDINANCES AND ALL APPLICABLE ORDINANCES.
- 15. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF SAN ANTONIO'S UNIFORM CODES AND ALL APPLICABLE ORDINANCES.
- 16. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF SAN ANTONIO'S VARIOUS ORDINANCES AND ALL APPLICABLE ORDINANCES.
- 17. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF SAN ANTONIO'S VARIOUS ORDINANCES AND ALL APPLICABLE ORDINANCES.
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- 20. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF SAN ANTONIO'S VARIOUS ORDINANCES AND ALL APPLICABLE ORDINANCES.



2. PASSENGER UNIT IN PLAN VIEW

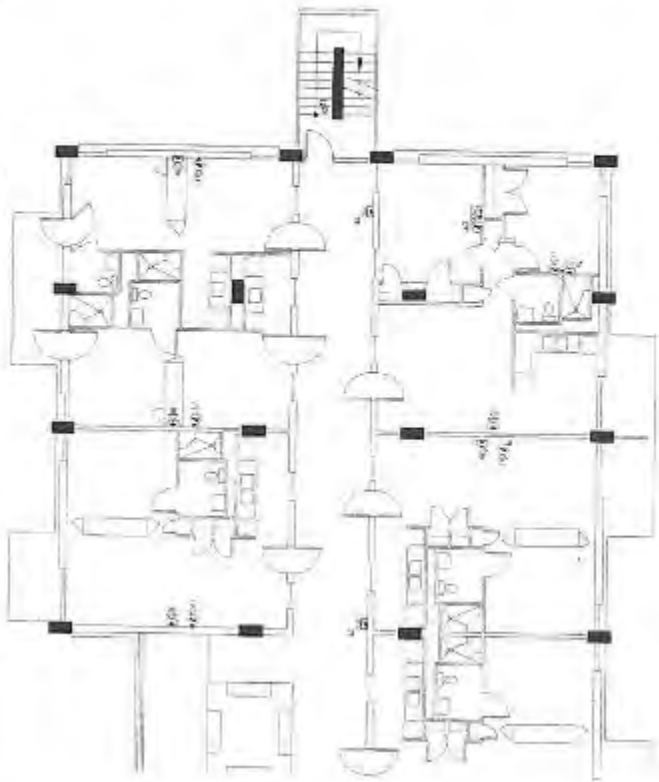


1. 1st FLOOR LEVEL 2 (1980)

90% REVIEW SET
NOT FOR CONSTRUCTION

<p>San Antonio Housing Authority HVAC, Fire Protection Systems & Life Safety Renovations Villa Tranchese Apartments 307 Medical Street San Antonio, Texas</p>	<p>KITNER ARCHITECTS 14000 San Antonio Road Suite 200 San Antonio, TX 78240 (214) 349-4000 www.kitner.com</p>	<p>FPCC FUNDATION FOR PUBLIC COMMUNITY CARE 14000 San Antonio Road Suite 200 San Antonio, TX 78240 (214) 349-4000 www.fpcc.org</p>	<p>STANLEY ARCHITECTS 14000 San Antonio Road Suite 200 San Antonio, TX 78240 (214) 349-4000 www.stanleyarch.com</p>
<p>PROJECT No. SAH17-11000 DATE: 01-13-2017 DRAWING NO. 10000 SHEET NO.</p>			

6



2. ENLARGED UNIT PLAN VIEW



1. PLAN LEVEL 2 HORIZONTAL

31, 40, 50, 67

INSTALLATION NOTES

- 1. All equipment shall be installed in accordance with the manufacturer's instructions.
- 2. All equipment shall be installed in accordance with the manufacturer's instructions.
- 3. All equipment shall be installed in accordance with the manufacturer's instructions.
- 4. All equipment shall be installed in accordance with the manufacturer's instructions.
- 5. All equipment shall be installed in accordance with the manufacturer's instructions.
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- 10. All equipment shall be installed in accordance with the manufacturer's instructions.

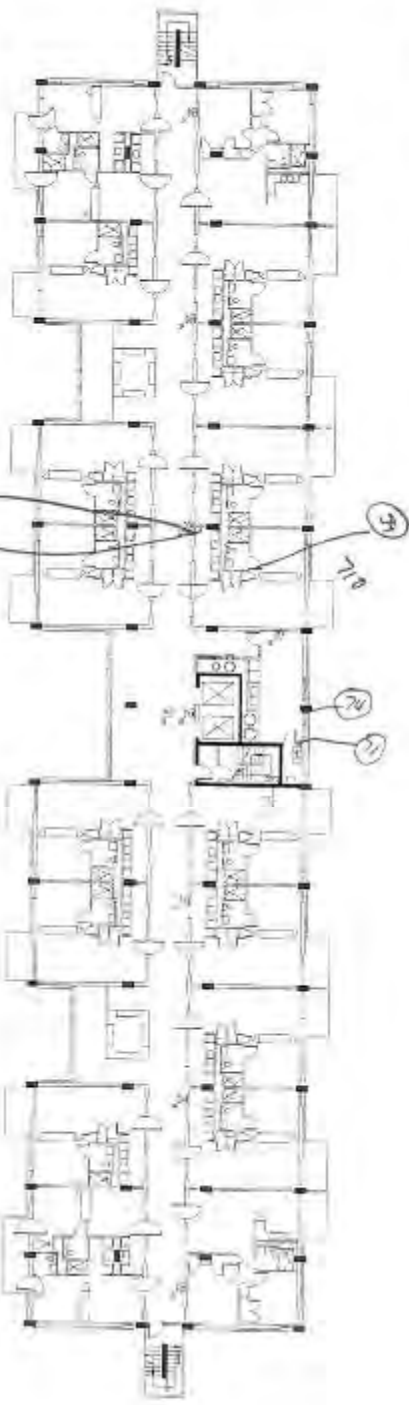
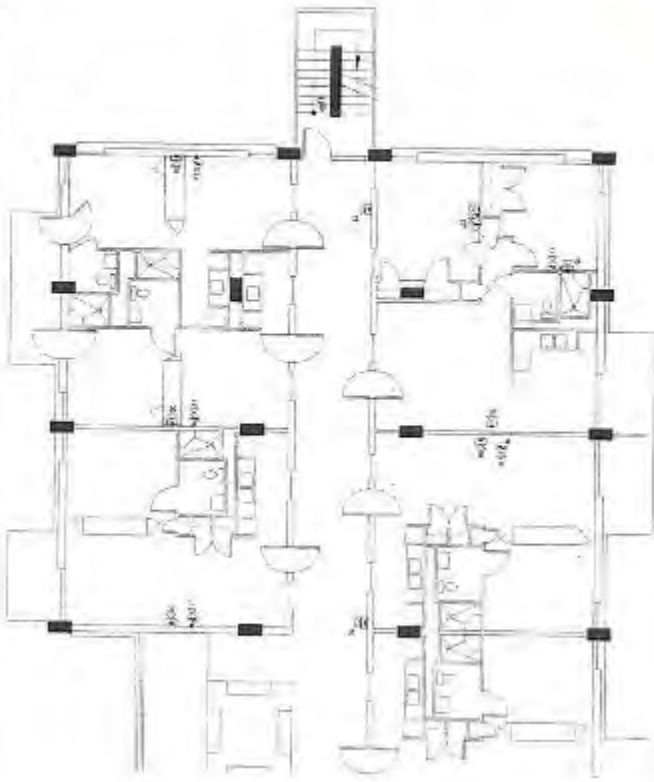
1. All equipment shall be installed in accordance with the manufacturer's instructions.
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10. All equipment shall be installed in accordance with the manufacturer's instructions.

90% REVIEW SET
NOT FOR CONSTRUCTION

San Antonio Housing Authority
HVAC, Fire Protection Systems & Life Safety Renovations
Villa Tranchese Apartments
 397 Marshall Street
 San Antonio, Texas

FA 201

7



NOTIFICATION NOTES

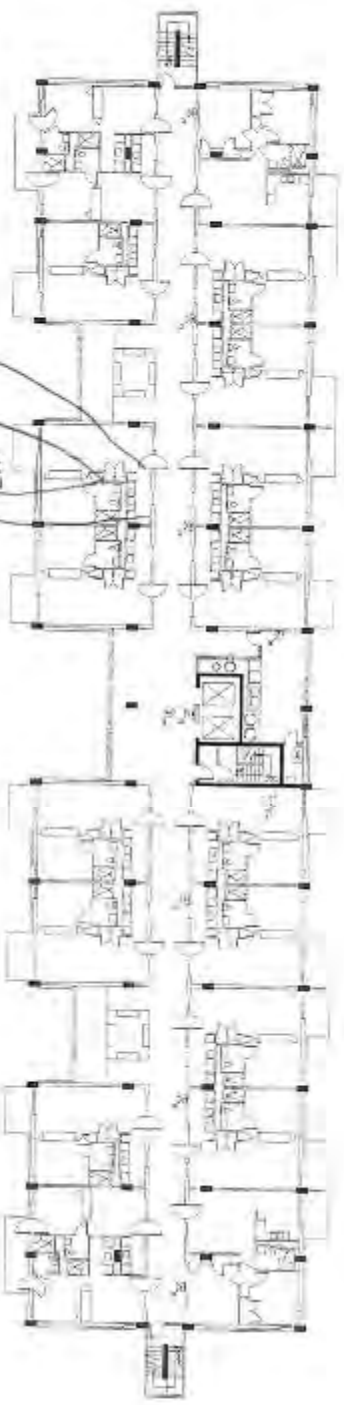
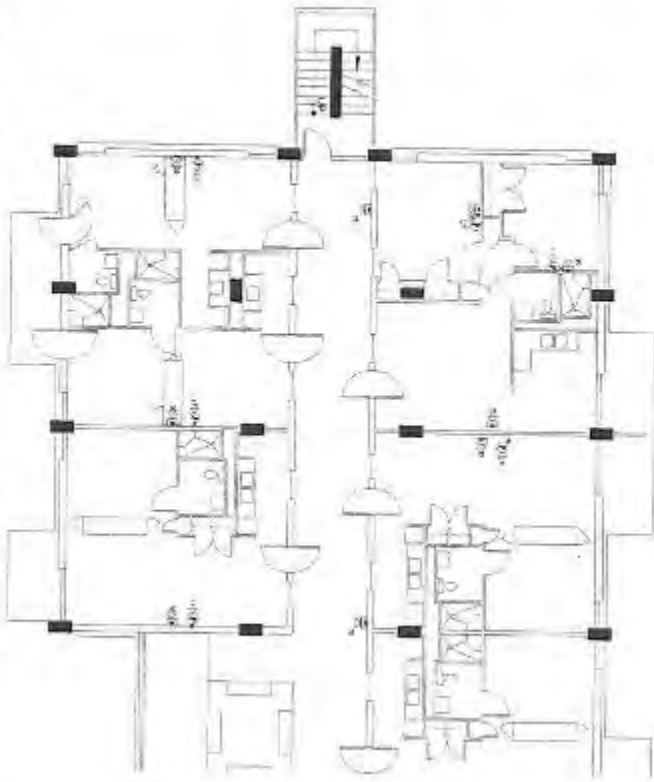
1. All work shall be completed in accordance with the schedule of work and the program of work.
2. All electrical work shall be completed in accordance with the schedule of work and the program of work.
3. All plumbing work shall be completed in accordance with the schedule of work and the program of work.
4. All mechanical work shall be completed in accordance with the schedule of work and the program of work.
5. All fire protection work shall be completed in accordance with the schedule of work and the program of work.
6. All life safety work shall be completed in accordance with the schedule of work and the program of work.
7. All other work shall be completed in accordance with the schedule of work and the program of work.

- 1. Fire Protection
- 2. Life Safety
- 3. Electrical
- 4. Plumbing
- 5. Mechanical
- 6. Other

90% REVIEW SET
NOT FOR CONSTRUCTION

	KISTENKAMP ARCHITECTS 1000 N. LOOP WEST SUITE 1000 DALLAS, TEXAS 75207 TEL: 214.750.1000 FAX: 214.750.1001 WWW.KISTENKAMP.COM
	PROJECT NO. 21880 II SHEET NO. 21880 II-01
PREPARED BY: [Name] CHECKED BY: [Name] DATE: [Date]	TITLE: [Title]
PROJECT NO. 21880 II SHEET NO. 21880 II-01	DATE: [Date]
PROJECT NO. 21880 II SHEET NO. 21880 II-01	DATE: [Date]

San Antonio Housing Authority
 HVAC, Fire Protection Systems & Life Safety Renovations
 Villa Tranchese Apartments
 107 Westway Street
 San Antonio, Texas



INSTALLATION NOTES

1. Read full set of drawings and specifications in order. Installation shall conform to all applicable codes and standards.
2. All materials shall be of the highest quality and shall be approved by the authority having jurisdiction.
3. All materials shall be installed in accordance with the manufacturer's instructions.
4. All materials shall be installed in accordance with the manufacturer's instructions.
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- 1. General Notes
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90% REVIEW SET
NOT FOR CONSTRUCTION

San Antonio Housing Authority
HVAC, Fire Protection Systems & Life Safety Renovations
Villa Franchise Apartments
 307 Marbach Street
 SAN ANTONIO, TEXAS

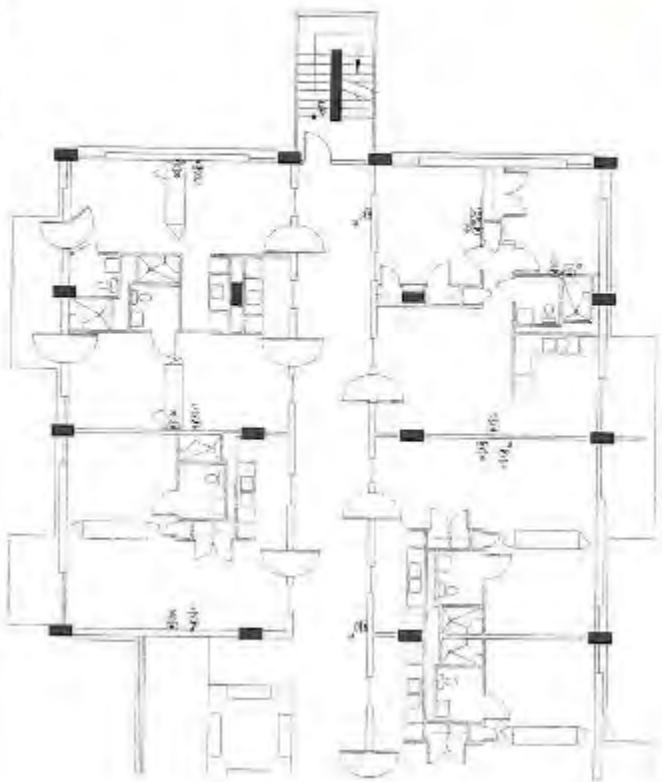
KISTNER
 Mechanical Division
 14027 Hwy 281, Suite 100
 San Antonio, Texas 78249
 210-495-1234
 www.kistnermech.com

APFCG
 Mechanical Division
 14027 Hwy 281, Suite 100
 San Antonio, Texas 78249
 210-495-1234
 www.apfcg.com

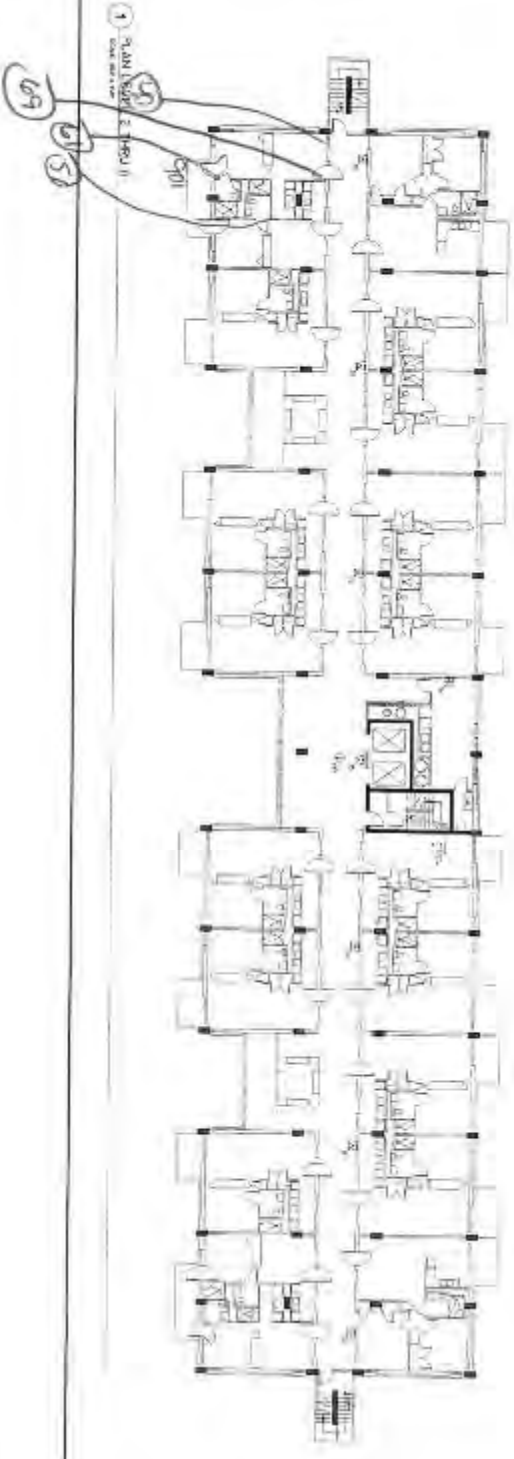
FA 201
 SHEET NO.

REVISION	DATE	DESCRIPTION
1	08/20/20	ISSUED FOR PERMIT
2	09/10/20	REVISED PER COMMENTS
3	10/15/20	REVISED PER COMMENTS
4	11/20/20	REVISED PER COMMENTS
5	12/15/20	REVISED PER COMMENTS
6	01/10/21	REVISED PER COMMENTS
7	02/05/21	REVISED PER COMMENTS
8	03/01/21	REVISED PER COMMENTS
9	03/25/21	REVISED PER COMMENTS
10	04/15/21	REVISED PER COMMENTS
11	05/10/21	REVISED PER COMMENTS
12	06/05/21	REVISED PER COMMENTS
13	07/01/21	REVISED PER COMMENTS
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27	09/01/22	REVISED PER COMMENTS
28	10/01/22	REVISED PER COMMENTS
29	11/01/22	REVISED PER COMMENTS
30	12/01/22	REVISED PER COMMENTS

4



2 ENLARGED UNIT FLOOR VIEW



1 MAIN FLOOR PLAN

INSTALLATION NOTES

- All materials shall be installed in accordance with the manufacturer's instructions and all work shall be done in accordance with the applicable code requirements.
- For the purpose of this contract, the contractor shall be responsible for obtaining all necessary permits and for the cost thereof.
- The contractor shall be responsible for the coordination of all trades and shall be responsible for the completion of all work in a timely manner.
- The contractor shall be responsible for the protection of all existing work and shall be responsible for the removal and disposal of all debris.
- The contractor shall be responsible for the installation of all equipment and shall be responsible for the testing and commissioning of all systems.
- The contractor shall be responsible for the maintenance of all records and shall be responsible for the completion of all punch list items.
- The contractor shall be responsible for the payment of all subcontractors and shall be responsible for the completion of all tax and insurance requirements.
- The contractor shall be responsible for the completion of all work in accordance with the contract documents and shall be responsible for the completion of all work in a timely manner.
- The contractor shall be responsible for the completion of all work in accordance with the contract documents and shall be responsible for the completion of all work in a timely manner.
- The contractor shall be responsible for the completion of all work in accordance with the contract documents and shall be responsible for the completion of all work in a timely manner.

- LEGEND**
- 1. General Notes
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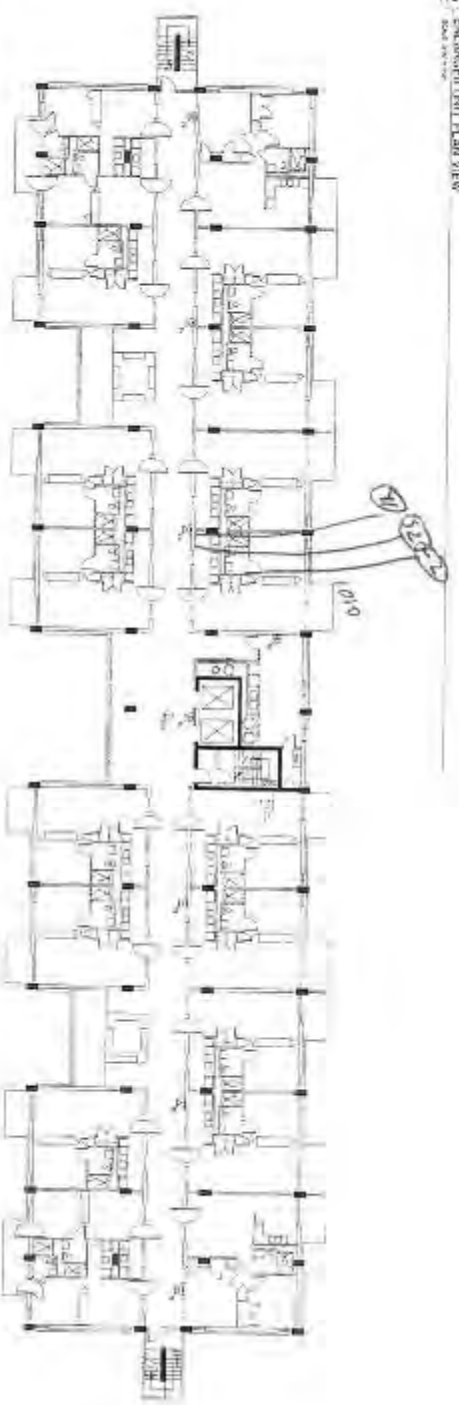
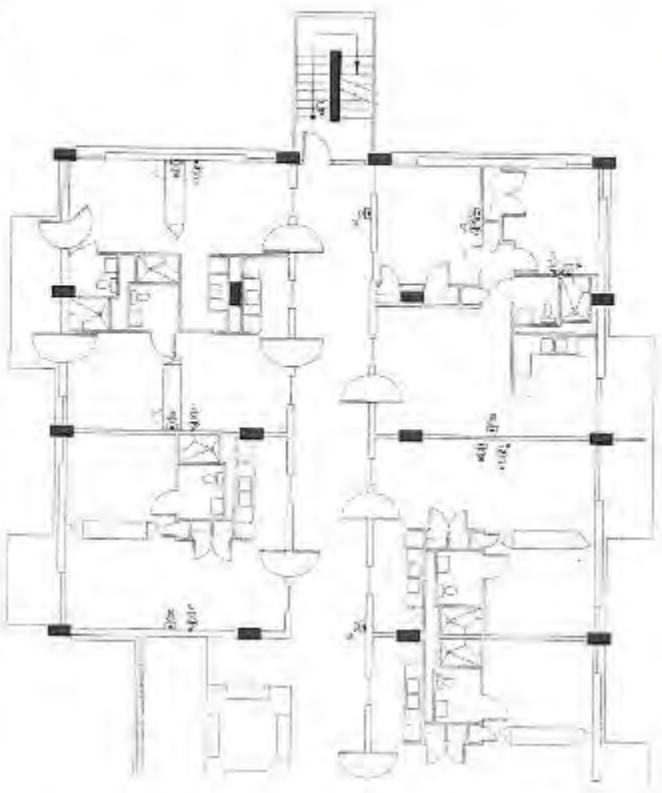
90% REVIEW SET
NOT FOR CONSTRUCTION

San Antonio Housing Authority
HVAC, Fire Protection Systems & Life Safety Renovations
Villa Tranchese Apartments
117 Marbach Street
San Antonio, Texas

KLEINFELDER ASSOCIATES
10010 North Loop West
Suite 1000
Houston, Texas 77037
713.861.0100
www.kleinfelder.com

FPCC
117 Marbach Street
San Antonio, TX 78204
713.861.0100

PROJECT NO.	2011-001
DATE	11/15/11
SCALE	AS SHOWN
DESIGNED BY	KL
CHECKED BY	KL
DATE	11/15/11
PROJECT NO.	2011-001
SHEET NO.	101



INSTALLATION NOTES

1. All electrical work shall be done in accordance with the National Electrical Code (NEC) and all applicable local codes.
2. All plumbing work shall be done in accordance with the International Plumbing Code (IPC) and all applicable local codes.
3. All mechanical work shall be done in accordance with the International Mechanical Code (IMC) and all applicable local codes.
4. All fire protection work shall be done in accordance with the National Fire Protection Association (NFPA) and all applicable local codes.
5. All life safety work shall be done in accordance with the International Building Code (IBC) and all applicable local codes.
6. All work shall be done in accordance with the manufacturer's instructions and all applicable codes.
7. All work shall be done in accordance with the project specifications and all applicable codes.
8. All work shall be done in accordance with the project schedule and all applicable codes.
9. All work shall be done in accordance with the project budget and all applicable codes.
10. All work shall be done in accordance with the project quality control and all applicable codes.

- 1. All work shall be done in accordance with the manufacturer's instructions and all applicable codes.
- 2. All work shall be done in accordance with the project specifications and all applicable codes.
- 3. All work shall be done in accordance with the project schedule and all applicable codes.
- 4. All work shall be done in accordance with the project budget and all applicable codes.
- 5. All work shall be done in accordance with the project quality control and all applicable codes.

90% REVIEW SET
NOT FOR CONSTRUCTION

San Antonio Housing Authority
 HVAC, Fire Protection Systems & Life Safety Renovations
 Villa Tranchese Apartments
 117 Maxwell Street
 San Antonio, Texas

R KETNER
 Mechanical, Electrical, Plumbing
 1221 East Loop East
 Suite 100
 Houston, TX 77029
 (713) 261-2020
 www.rketner.com

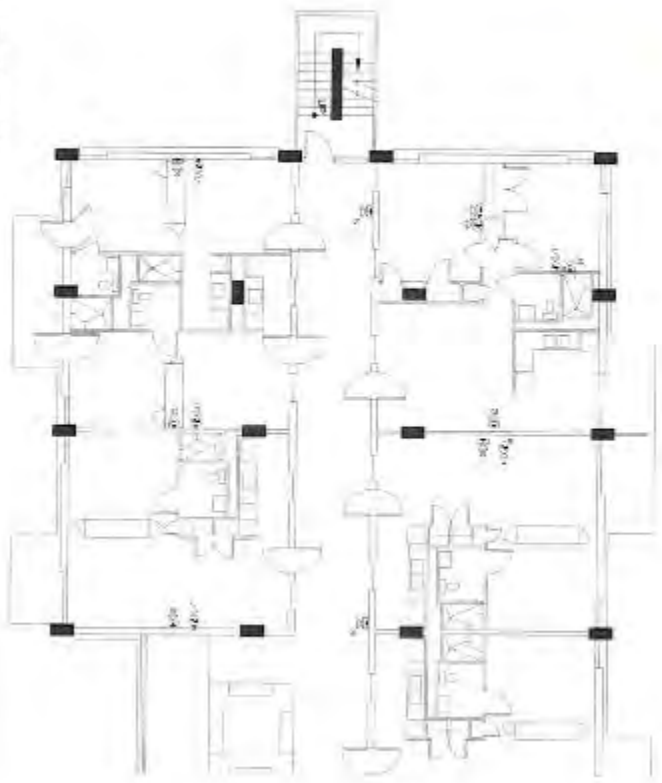
FPCG
 Fire Protection Consulting Group
 2000 West Loop West
 Suite 1000
 Houston, TX 77027
 (713) 261-2020

PROJECT NO.	100-100-01
DATE	10-15-11
SCALE	AS SHOWN
SHEET NO.	100-100-01-01
TITLE	PLAN LEVEL 2 THIRD
DESIGNED BY	J. B. BROWN
CHECKED BY	J. B. BROWN
DATE	10-15-11

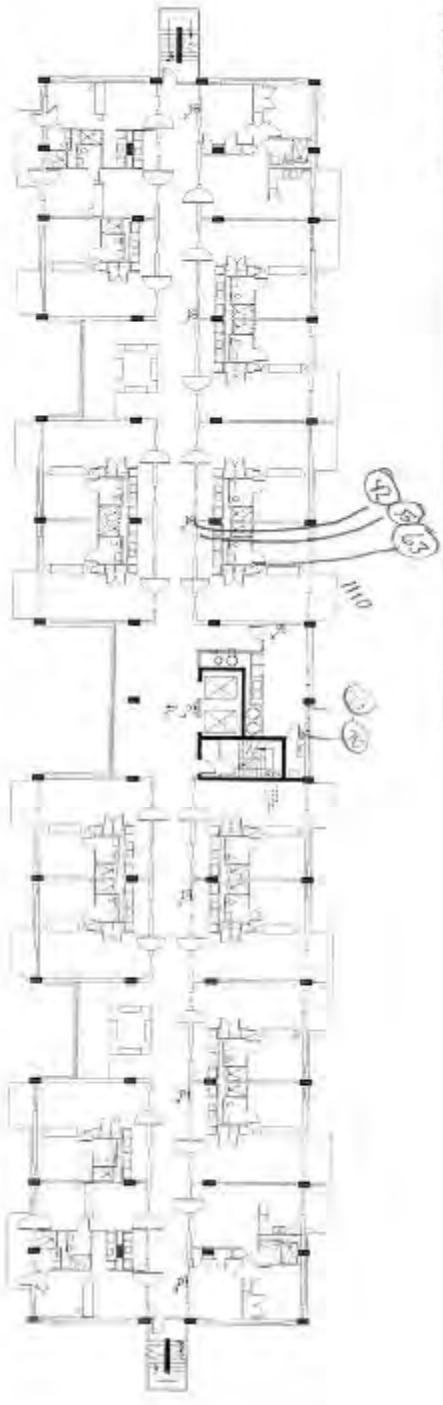


INSTALLATION NOTES

1. All equipment shall be installed in a location that provides adequate clearance for service and operation.
2. All equipment shall be installed in a location that provides adequate clearance for service and operation.
3. All equipment shall be installed in a location that provides adequate clearance for service and operation.
4. All equipment shall be installed in a location that provides adequate clearance for service and operation.
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6. All equipment shall be installed in a location that provides adequate clearance for service and operation.
7. All equipment shall be installed in a location that provides adequate clearance for service and operation.
8. All equipment shall be installed in a location that provides adequate clearance for service and operation.
9. All equipment shall be installed in a location that provides adequate clearance for service and operation.
10. All equipment shall be installed in a location that provides adequate clearance for service and operation.



2. ENLARGED UNIT PLAN VIEW
Scale: 1/8" = 1'-0"



1. MAIN LEVEL 2 (PDU II)
Scale: 1/8" = 1'-0"

90% REVIEW SET
NOT FOR CONSTRUCTION

KISNER
KISNER ENGINEERING & ARCHITECTURE
1281 West 34th Street
San Antonio, TX 78216
Phone: 214-349-1234
Fax: 214-349-1235
www.kisner.com

San Antonio Housing Authority
HVAC, Fire Protection Systems & Life Safety Renovations
Villa Franchise Apartments
307 Vossler Street
San Antonio, Texas

FPCG
FPCG CONSULTANTS
10000 North Loop West
Houston, TX 77067
Phone: 281-465-1000
www.fpcg.com

REVISIONS

NO.	DATE	DESCRIPTION

PROJECT INFORMATION

PROJECT NO. 201-001-01
SHEET NO. FA 201

DESIGNER

DATE: 01/11/12
DRAWN BY: J. B. BROWN
CHECKED BY: J. B. BROWN
APPROVED BY: J. B. BROWN

22 May 2018

DOCUMENT 000101 - PROJECT TITLE PAGE

1.1 PROJECT MANUAL

- A. Project Name:
PHASE B – FIRE PROTECTION SYSTEMS & LIFE SAFETY RENOVATIONS.
Villa Tranchese Apartments
307 Marshall Street
San Antonio, Texas 78212
- B. Owner:
San Antonio Housing Authority.
818 S. Flores Street
San Antonio, Texas 78204
- C. Project Manager/Architect:
Raba Kistner Consultants Inc.
12821 W. Golden Lane
San Antonio, Texas 78249

www.rkci.com

Phone: 210-699-9090
Fax: 210-699-6426

Architect Project No. ASR17-019-00.
- D. Issued: 22 May 2018.
- E. Copyright 2018 Raba Kistner Consultants Inc. All rights reserved.

END OF DOCUMENT 000101

22 May 2018

DOCUMENT 000107 - SEALS PAGE

1.1 DESIGN PROFESSIONALS OF RECORD

A. Architect:

1. Robert L. Raffle.
2. License # 24779.
3. Responsible for Divisions 01 thru 02 and 06 thru 14 Sections except where indicated as prepared by other design professionals of record.



Robert L. Raffle
6-25-2018

B. Structural Engineer:

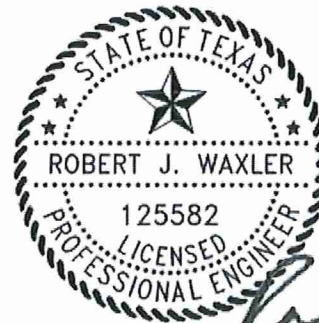
1. Robert L, Raffle.
2. License # 121122.
3. Responsible for Divisions 03 thru 05 Sections.



Robert L. Raffle
6-25-2018

C. Fire-Protection & Fire Alarm Engineer:

1. Robert J. Waxler.
2. License # 125582.
3. Responsible for Divisions 21 and 28 Sections except where indicated as prepared by other design professionals of record.



Robert J. Waxler
06/25/2018

D. HVAC Engineer:

1. Michael Hayes
2. License # 128065.
3. Responsible for Division 23 Sections.



Michael S. Hayes
6/25/18

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RKCI Project No: ASR17-019-00

22 May 2018

E. Electrical Engineer:

1. Jonathan Garcia.
2. License # 124661.
3. Responsible for Divisions 26 and 28 Sections except where indicated by other design professional of record.



[Handwritten signature]
06/25/2018

END OF DOCUMENT 000107

DOCUMENT 000110 – TABLE OF CONTENTS

1.1 PROJECT MANUAL

A. DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS

1. 000101 – Project Title Page
2. 000107 – Seals Page
3. 000110 – Table of Contents
4. 000115 – List of Drawing Sheets
5. 001113 – Advertisement for Bids [Provided by SAHA]
6. 001116 – Invitation to Bid [Provided by SAHA]
7. 002113 – Instructions to Bidders [Provided by SAHA]
8. 002213 – Supplementary Instructions to Bidders [Provided by SAHA]
9. 002513 – Prebid Meetings [Provided by SAHA]
10. 003126 – Existing Hazardous Material Information [Provided by SAHA]
11. 004113 – Bid Form – Stipulated Sum (Single- Prime Contractor) [Provided by SAHA]
12. 004313 – Bid Security Forms [Provided by SAHA]
13. 004393 – Bid Submittal Checklist [Provided by SAHA].

B. DIVISION 01 – GENERAL REQUIREMENTS

1. 011000 – Summary
2. 012200 – Unit Prices
3. 012600 – Contract Modification Procedures
4. 013100 – Project Management and Coordination
5. 013200 – Construction Progress Documentation
6. 013233 – Photographic Documentation
7. 013300 – Submittal Procedures
8. 013516 – Alteration Project Procedures
9. 015000 – Temporary Facilities and Controls
10. 016000 – Product Requirements
11. 017300 – Execution
12. 017419 – Construction Waste Management and Disposal
13. 017700 – Closeout Procedures
14. 017823 – Operation and Maintenance Data
15. 017839 – Project Record Documents
16. 017900 – Demonstration and Training.

C. DIVISION 02 – EXISTING CONDITIONS

1. 024119 – Selective Demolition.

D. DIVISION 03 – CONCRETE: Refer to Drawings A0 thru A7.

E. DIVISION 04 – MASONRY: Refer to Drawings A0 thru A7.

F. DIVISION 05 – METALS: Refer to Drawings A0 thru A7.

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- G. DIVISION 06 – WOOD, PLASTICS AND COMPOSITES: Not Applicable.
- H. DIVISION 07 – THERMAL AND MOISTURE PROTECTION: Refer to Drawings A0 thru A7 in addition to:
 - 1. 078413 – Penetration Firestopping
- I. DIVISION 08 – OPENINGS: Refer to Drawings A0 thru A7.
- J. DIVISION 09 – FINISHES: Refer to Drawings A0 thru A7.
- K. DIVISION 10 – SPECIALTIES thru DIVISION 14 – CONVEYING EQUIPMENT: Not applicable.
- L. DIVISION 21 – FIRE PROTECTION SYSTEMS [Fire Protection Consulting Group]
 - 1. 210000 – Fire Protection
 - 2. 210529 – Hangers and Supports
 - 3. 210533 – Heat Tracing for Fire Suppression Systems
 - 4. 210719 – Fire Suppression Systems Insulation
 - 5. 211313 – Wet-Pipe Fire Sprinkler Systems
 - 6. 213113 – Centrifugal Fire Pump
- M. DIVISION 22 – PLUMBING: Not applicable.
- N. DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC) [Cleary-Zimmermann Engineers]
 - 1. 230100 – Special Conditions for All Mechanical Work
 - 2. 230513 – Basic Mechanical Materials and Methods
 - 3. 230529 – Hangers and Supports for HVAC Piping and Equipment
 - 4. 230553 – Mechanical Identification
 - 5. 238239 – Unit Heaters
- O. DIVISION 26 – ELECTRICAL [Cleary-Zimmermann Engineers]
 - 1. 260005 – Electrical Demolition
 - 2. 260015 – General Conditions for All Electrical Work
 - 3. 260050 – Basic Electrical Materials and Methods
 - 4. 260519 – Conductors and Cables
 - 5. 260526 – Grounding and Bonding
 - 6. 260533 – Raceways and Boxes
 - 7. 260553 – Electrical Identification
 - 8. 261210 – Control/Signal Transmission Media
 - 9. 261310 – Pull and Junction Boxes
 - 10. 262310 – Packaged Engine Generators
 - 11. 262726 – Wiring Devices
 - 12. 262816 – Disconnect Switches and Circuit Breakers
 - 13. 263450 – Short Circuit/Coordination Study/Arc Flash Hazard Analysis
 - 14. 263620 – Bypass Transfer Switches.
- P. DIVISION 28 – SECURITY

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1. 283101 – Fire Alarm Voice Alarm Communication System [Fire Protection Consulting Group]

Q. DIVISION 32 – EXTERIOR IMPROVEMENTS: Refer to Drawings A0 thru A7.

END OF DOCUMENT 000110

DOCUMENT 000115 - LIST OF DRAWING SHEETS

1.1 LIST OF DRAWINGS

A. List of Drawings: Drawings consist of the following Contract Drawings:

1. CS0-B COVER SHEET
2. ME-0B MEP SYMBOLS AND ABBREVIATIONS
3. MED-1B MECHANICAL/ELECTRICAL SITE PLAN - DEMO
4. MED-2B MECHANICAL/ELECTRICAL BASEMENT PLAN – DEMO
5. ME-1B MECHANICAL/ELECTRICAL SITE PLAN
6. ME-2B MECHANICAL/ELECTRICAL BASEMENT PLAN
7. ME-3B MECHANICAL/ELECTRICAL FIRST LEVEL (WEST END) PLAN
8. ME-4B MECHANICAL/ELECTRICAL FIRST LEVEL (EAST END) PLAN
9. ME-5B MECHANICAL/ELECTRICAL TYPICAL UPPER LEVELS 2-10 (EVEN)
PLAN
10. ME-6B MECHANICAL/ELECTRICAL TYPICAL UPPER LEVELS 3-11 (ODD)
PLAN
11. ME-7B ELECTRICAL ONE-LINE DIAGRAM
12. FA100 SITE PLAN AND GENERAL NOTES
13. FA200 BASEMENT AND FIRST LEVEL FLOOR PLAN
14. FA201 TYPICAL UPPER LEVEL AND ENLARGED UNIT PLAN
15. FA300 SEQUENCE OF OPERATIONS
16. FS100 SITE PLAN AND GENERAL NOTES
17. FS200 BASEMENT AND FIRST LEVEL PLANS
18. FS201 UPPER LEVEL AND ENLARGED UNIT PLAN
19. FS202 PENTHOUSE PLAN AND BUILDING SECTION
20. FS300 PUMP ROOM AND SPRINKLER DETAILS

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RKCI Project No: ASR17-019-00

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21. FS301 SPRINKLER SYSTEM DETAILS
22. A0-B SPECIFICATIONS, NOTES AND LEGENDS
23. A1-B SITE PLAN
24. A2-B BASEMENT PLAN
25. A3-B FIRST LEVEL PLAN (WEST END)
26. A4-B FIRST LEVEL PLAN (EAST END)
27. A5-B TYPICAL UPPER LEVEL PLAN
28. A6-B FIRST LEVEL REFLECTED CEILING PLAN (WEST END)
29. A7-B FIRST LEVEL REFLECTED CEILING PLAN (EAST END)

END OF DOCUMENT 000115

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Access to site.
4. Coordination with occupants.
5. Work restrictions.
6. Specification and Drawing conventions.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

A. Project Identification: HVAC, Fire Protection & Life Safety Renovations.

1. Project Location: Villa Tranchese Apartments, 307 Marshall Street, San Antonio, Texas 78212.

B. Owner: San Antonio Housing Authority, 818 S. Flores St., San Antonio, Texas 78204.

1. Owner's Representative: L. Michael Lopez, Construction Project Manager, Ph: 210-477-6407.

C. Architect: Raba Kistner Consultants, Inc., 12821 W. Golden Lane, San Antonio, Texas 78249.

1. Architect's Representative: Robert L. Raffle, PE, AIA, Project Manager, Ph: 210-699-9090.

D. Architect's Consultants: Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:

SAN ANTONIO HOUSING AUTHORITY

Villa Tranchese Apartments:

PHASE B – Fire Protection Systems & Life Safety Renovations

RKCI Project No: ASR17-019-00

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1. Mechanical & Electrical Consultant: Cleary Zimmermann Engineers, 1344 S. Flores, Suite 101, San Antonio, Texas 78204.
2. Fire Protection and Fire Alarm Consultant: Fire Protection Consulting Group, LLC, 339 Sandalwood Lane, San Antonio, Texas 78216.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. Mechanical and electrical selective demolition.
2. New emergency generator and associated electrical work including automatic transfer switches.
3. Fire alarm system replacement to include, but not be limited to, apartment unit smoke detection/low frequency notification, building wide voice evacuation and monitoring sprinkler system and fire pump devices.
4. New wet-pipe sprinkler protection system throughout the building including new standpipe with flow control valves and fire pump.
5. New double-check backflow preventer in new vault.
6. Firestopping of new and existing duct/pipe/conduit penetrations through fire rated assemblies in the Basement and Penthouse.
7. Firestopping of new duct/pipe/conduit penetrations through fire rated assemblies from the First Floor to the Eleventh Floor.
8. Demolition of existing CMU walls and installation of fire rated CMU enclosure for new fire pump.
9. Remove existing window air conditioners on first level and relinquish to Owner. Re-glaze openings to match existing window treatments.
10. Hardware retrofit of miscellaneous building doors and premises gates for code required egress.
11. Painted drywall enclosures for sprinkler piping crossing public corridors.
12. Removal and reinstallation of existing ceiling panels, diffusers/grilles and light fixtures on the first level for installation of new mechanical, electrical, fire alarm and fire sprinkler work.
13. Other work as described in the Contract Drawings and Specifications or required by work described to provide a complete and operable installation.

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PHASE B – Fire Protection Systems & Life Safety Renovations

RKCI Project No: ASR17-019-00

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B. Type of Contract:

1. Project will be constructed under a single prime contract.

1.5 ACCESS TO SITE

A. General: Contractor shall have limited use of Project site for construction operations as indicated by requirements of this Section.

B. Use of Site: Limit use of Project site to Work in areas defined by the Project Schedule. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Driveways, Walkways and Entrances: Keep driveways, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.

- a. Schedule deliveries to minimize use of driveways and entrances by construction operations.

- b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

D. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.6 COORDINATION WITH OCCUPANTS

A. Full Owner Occupancy: Owner will occupy site and existing building during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.

2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.

3. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.

SAN ANTONIO HOUSING AUTHORITY

Villa Tranchese Apartments:

PHASE B – Fire Protection Systems & Life Safety Renovations

RKCI Project No: ASR17-019-00

22 May 2018

4. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

1.7 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 8 a.m. to 5 p.m., Monday through Friday, unless otherwise indicated.
 1. Hours for Utility Shutdowns: Coordinate with Architect and Owner.
 2. Hours for Core Drilling Coordinate with Architect and Owner.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 1. Notify Architect and Owner not less than two days in advance of proposed utility interruptions.
 2. Obtain Architect's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
 1. Notify Architect and Owner not less than two days in advance of proposed disruptive operations.
 2. Obtain Architect's written permission before proceeding with disruptive operations.
- E. Restricted Substances: Use of tobacco products and other controlled substances within the existing building and on Project site is not permitted.
- F. Employee Identification: Owner will provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
- G. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
 1. Maintain list of approved screened personnel with Owner's representative.

SAN ANTONIO HOUSING AUTHORITY

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PHASE B – Fire Protection Systems & Life Safety Renovations

RKCI Project No: ASR17-019-00

22 May 2018

1.8 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012200 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for unit prices.
- B. Related Requirements:
 - 1. Section 012600 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.

1.3 DEFINITIONS

- A. Unit price is a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: Measurement shall be per the Unit of Measurement noted in Part 3 for each Unit Price. Payment shall be made by adjustment of the Contract Amount with the execution of a Change Order Proposal as discussed in Section 012600 "Contract Modification Procedures".
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

22 May 2018

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

A. Unit Price No. 1: Removal and replacement of lay-in acoustical ceiling tile.

1. Description: Lay-in ceiling tile on the First Level as indicated and described on Contract Drawings A6 and A7 for the purpose of access and installation of fire alarm and fire sprinkler systems and other mechanical/electrical systems.
2. Unit of Measurement: Square feet of lay-in ceiling tile replaced.

B. Unit Price No. 2: Removal and replacement of suspended ceiling grid system.

1. Description: Suspended ceiling grid system on the First Level as indicated and described on Contract Drawings A6 and A7 for the purpose of access and installation of fire alarm and fire sprinkler systems and other mechanical/electrical systems.
2. Unit of Measurement: Linear foot of suspended ceiling grid system.

END OF SECTION 012200

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. RFIs.
 - 4. Digital project management procedures.
 - 5. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Requirements:
 - 1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 2. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

- A. RFI: Request for Information. Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

SAN ANTONIO HOUSING AUTHORITY

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PHASE B – Fire Protection Systems & Life Safety Renovations

RKCI Project No: ASR17-019-00

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1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
 2. Number and title of related Specification Section(s) covered by subcontract.
 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within 15 days prior to starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
1. Post copies of list in project meeting room, in temporary field office, and in prominent location in built facility. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its own operations with operations included in different Sections that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

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- D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's construction schedule.
 2. Preparation of the schedule of values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Preinstallation conferences.
 7. Project closeout activities.
 8. Startup and adjustment of systems.

1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.
 - g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:

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1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
 2. Plenum Space: Indicate subframing for support of ceiling, raised access floor, and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
 3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
 4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
 5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
 6. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
 7. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
 - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor-control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
 8. Fire-Protection System: Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
 9. Review: Architect will review coordination drawings to confirm that in general the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.
 10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."
- C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:

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1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
2. File Preparation Format: DWG, Version AutoCAD, operating in Microsoft Windows operating system.
3. File Submittal Format: Submit or post coordination drawing files using format same as file preparation format and PDF format.
4. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
 - a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.

1.7 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 1. Project name.
 2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Architect.
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

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- C. RFI Forms: AIA Document G716 or Software-generated form with substantially the same content as indicated above, acceptable to Architect.
1. Attachments shall be electronic files in PDF format.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal.
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log monthly Insert time. Include the following:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect.
 4. RFI number including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's response was received.
 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

1.8 DIGITAL PROJECT MANAGEMENT PROCEDURES

- A. Use of Architect's Digital Data Files: Digital data files of Architect's CAD drawings will be provided by Architect for Contractor's use during construction.
1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project record Drawings.
 2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
 3. Digital Drawing Software Program: Contract Drawings are available in AutoCAD or DXF format.
- B. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.9 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of 10 working days prior to meeting.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
- B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
1. Attendees: Authorized representatives of Owner Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Responsibilities and personnel assignments.
 - b. Tentative construction schedule.

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- c. Phasing.
 - d. Critical work sequencing and long lead items.
 - e. Designation of key personnel and their duties.
 - f. Lines of communications.
 - g. Procedures for processing field decisions and Change Orders.
 - h. Procedures for RFIs.
 - i. Procedures for testing and inspecting.
 - j. Procedures for processing Applications for Payment.
 - k. Distribution of the Contract Documents.
 - l. Submittal procedures.
 - m. Preparation of Record Documents.
 - n. Use of the premises and existing building.
 - o. Work restrictions.
 - p. Working hours.
 - q. Owner's occupancy requirements.
 - r. Responsibility for temporary facilities and controls.
 - s. Procedures for disruptions and shutdowns.
 - t. Construction waste management and recycling.
 - u. Parking availability.
 - v. Office, work, and storage areas.
 - w. Equipment deliveries and priorities.
 - x. First aid.
 - y. Security.
 - z. Progress cleaning.
3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other sections and when required for coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect and Owner of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.

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- j. Compatibility requirements.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written instructions.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. Protection of construction and personnel.
3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 30 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of Record Documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Procedures for completing and archiving web-based Project software site data files.
 - d. Submittal of written warranties.
 - e. Requirements for preparing operations and maintenance data.
 - f. Requirements for demonstration and training.
 - g. Preparation of Contractor's punch list.

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- h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - i. Submittal procedures.
 - j. Responsibility for removing temporary facilities and controls.
 - 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Conduct progress meetings at weekly intervals.
 - 1. Coordinate dates of meetings with preparation of payment requests.
 - 2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site use.
 - 8) Temporary facilities and controls.
 - 9) Progress cleaning.
 - 10) Quality and work standards.
 - 11) Status of correction of deficient items.
 - 12) Field observations.
 - 13) Status of RFIs.
 - 14) Status of Proposal Requests.
 - 15) Pending changes.
 - 16) Status of Change Orders.
 - 17) Pending claims and disputes.
 - 18) Documentation of information for payment requests.

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4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
 - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- F. Coordination Meetings: Conduct Project coordination meetings at regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
 1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each contractor present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site use.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Status of RFIs.
 - 14) Proposal Requests.
 - 15) Change Orders.

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- 16) Pending changes.
3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Startup construction schedule.
 - 2. Contractor's Construction Schedule.
 - 3. Construction schedule updating reports.
 - 4. Daily construction reports.
 - 5. Material location reports.
 - 6. Site condition reports.
 - 7. Unusual event reports.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

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- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Resource Loading: The allocation of manpower and equipment necessary for completing an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
 - 1. Working electronic copy of schedule file, where indicated.
 - 2. PDF file.
 - 3. Two paper copies, of sufficient size to display entire period or schedule, as required.
- B. Startup construction schedule.
 - 1. Submittal of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.
- C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
 - 1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.
- E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
 - 1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
 - 2. Logic Report: List of preceding and succeeding activities for each activity, sorted in ascending order by activity number and then by early start date, or actual start date if known.

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3. Total Float Report: List of activities sorted in ascending order of total float.
 4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.
- F. Construction Schedule Updating Reports: Submit with Applications for Payment.
- G. Daily Construction Reports: Submit at weekly intervals.
- H. Material Location Reports: Submit at weekly intervals.
- I. Site Condition Reports: Submit at time of discovery of differing conditions.
- J. Unusual Event Reports: Submit at time of unusual event.
- K. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

- A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.
- B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's Construction Schedule, including, but not limited to, the following:
1. Review software limitations and content and format for reports.
 2. Verify availability of qualified personnel needed to develop and update schedule.
 3. Discuss constraints, including phasing, work stages, area separations and interim milestones.
 4. Review submittal requirements and procedures.
 5. Review time required for review of submittals and resubmittals.
 6. Review requirements for tests and inspections by independent testing and inspecting agencies.
 7. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
 8. Review and finalize list of construction activities to be included in schedule.
 9. Review procedures for updating schedule.

1.6 COORDINATION

- A. Coordinate Contractor's Construction Schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

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1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

1.7 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
 1. Use Microsoft Project, Primavera, or Meridian Prolog for current Windows operating system.
- B. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.
 1. In-House Option: Owner may waive requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
 2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.
- C. Time Frame: Extend schedule from date established for commencement of the Work to date of final completion.
 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- D. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - a. HVAC Equipment
 - b. Electrical Equipment
 - c. Fire Alarm System Shop Drawings
 - d. Sprinkler System Shop Drawings.
 3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
 4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.

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5. Commissioning Time: Include no fewer than 15 days for commissioning.
 6. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
 7. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
- E. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
 2. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Use-of-premises restrictions.
 - e. Seasonal variations.
 - f. Environmental control.
 3. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Deliveries.
 - e. Installation.
 - f. Tests and inspections.
 - g. Adjusting.
 - h. Startup and placement into final use and operation.
 - i. Commissioning.
 4. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Temporary enclosure and space conditioning.
 - c. Permanent space enclosure.
 - d. Completion of mechanical installation.
 - e. Completion of electrical installation.
 - f. Substantial Completion.
- F. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.

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- G. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
 2. Unanswered Requests for Information.
 3. Rejected or unreturned submittals.
 4. Notations on returned submittals.
 5. Pending modifications affecting the Work and the Contract Time.
- H. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate final completion percentage for each activity.
- I. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.
- J. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

1.8 STARTUP CONSTRUCTION SCHEDULE

- A. Gantt-Chart Schedule: Submit startup, horizontal, Gantt-chart-type construction schedule within seven days of date established for commencement of the Work.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

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1.9 GANTT-CHART SCHEDULE REQUIREMENTS

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for the Notice of Award.
 - 1. Base schedule on the startup construction schedule and additional information received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
 - 1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

1.10 CPM SCHEDULE REQUIREMENTS

- A. General: Prepare network diagrams using AON (activity-on-node) format.
- B. Startup Network Diagram: Submit diagram within 14 days of date established for the Notice of Award. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
- C. CPM Schedule: Prepare Contractor's Construction Schedule using a cost- and resource-loaded, time-scaled CPM network analysis diagram for the Work.
 - 1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 30 days after date established for the Notice of Award.
 - a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates.
 - 2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
 - 3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 - 4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule to coordinate with the Contract Time.
- D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.
 - 1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

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- a. Preparation and processing of submittals.
 - b. Mobilization and demobilization.
 - c. Purchase of materials.
 - d. Delivery.
 - e. Fabrication.
 - f. Utility interruptions.
 - g. Installation.
 - h. Testing and inspection.
 - i. Commissioning.
 - j. Punch list and final completion.
 - k. Activities occurring following final completion.
2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
 3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
 4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
 5. Cost- and Resource-Loading of CPM Schedule: Assign cost to construction activities on the CPM schedule. Do not assign costs to submittal activities. Obtain Architect's approval prior to assigning costs to fabrication and delivery activities. Assign costs under main subcontracts for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project record documents, and demonstration and training (if applicable), in the amount of 5 percent of the Contract Sum.
 - a. Each activity cost shall reflect an appropriate value subject to approval by Architect.
 - b. Total cost assigned to activities shall equal the total Contract Sum.
- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall Project schedule.
- F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
 2. Description of activity.
 3. Main events of activity.
 4. Immediate preceding and succeeding activities.
 5. Early and late start dates.

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6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
9. Average size of workforce.
10. Dollar value of activity (coordinated with the schedule of values).

G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

H. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.

1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
 - a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
 - b. Submit value summary printouts one week before each regularly scheduled progress meeting.

1.11 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. Approximate count of personnel at Project site.
3. Equipment at Project site.
4. Material deliveries.
5. Testing and inspection.
6. Accidents.
7. Meetings and significant decisions.
8. Unusual events.
9. Stoppages, delays, shortages, and losses.

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10. Meter readings and similar recordings.
 11. Emergency procedures.
 12. Orders and requests of authorities having jurisdiction.
 13. Change Orders received and implemented.
 14. Construction Change Directives received and implemented.
 15. Services connected and disconnected.
 16. Equipment or system tests and startups.
 17. Partial completions and occupancies.
 18. Substantial Completions authorized.
- B. Material Location Reports: At weekly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:
1. Material stored prior to previous report and remaining in storage.
 2. Material stored prior to previous report and since removed from storage and installed.
 3. Material stored following previous report and remaining in storage.
- C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.
- D. Unusual Event Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, and responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.
1. Submit unusual event reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013200

SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Periodic construction photographs.
 - 3. Final completion construction photographs.
- B. Related Requirements:
 - 1. Section 017700 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.
 - 2. Section 024119 "Selective Demolition" for photographic documentation before selective demolition operations commence.

1.3 INFORMATIONAL SUBMITTALS

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- B. Digital Photographs: Submit image files within three days of taking photographs.
 - 1. Submit photos on CD-ROM or thumb-drive. Include copy of key plan indicating each photograph's location and direction.
 - 2. Identification: Provide the following information with each image description in file metadata tag:
 - a. Name of Project.
 - b. Name of Architect.
 - c. Name of Contractor.
 - d. Date photograph was taken.
 - e. Description of location, vantage point, and direction.
 - f. Unique sequential identifier keyed to accompanying key plan.

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1.4 QUALITY ASSURANCE

- A. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of construction projects for not less than three years.

1.5 FORMATS AND MEDIA

- A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 3200 by 2400 pixels, and with vibration-reduction technology. Use flash in low light levels or backlit conditions.
- B. Metadata: Record accurate date and time from camera.
- C. File Names: Name media files with Project area and sequential numbering suffix.

1.6 CONSTRUCTION PHOTOGRAPHS

- A. Photographer: Engage a qualified photographer to take construction photographs.
- B. General: Take photographs with maximum depth of field and in focus.
 - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- C. Preconstruction Photographs: Before starting construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.
 - 1. Take 20 photographs to show existing conditions adjacent to property before starting the Work.
 - 2. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- D. Periodic Construction Photographs: Take a minimum of 20 photographs weekly. Select vantage points to show status of construction and progress since last photographs were taken.
- E. Final Completion Construction Photographs: Take a minimum of 20 photographs after date of Substantial Completion for submission as Project Record Documents. Architect will inform photographer of desired vantage points.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013233

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Submittal schedule requirements.
- 2. Administrative and procedural requirements for submittals.

- B. Related Requirements:

- 1. Section 013100 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
- 2. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
- 3. Section 013233 "Photographic Documentation" for submitting preconstruction photographs, periodic construction photographs, and final completion construction photographs.
- 4. Section 017700 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
- 5. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
- 6. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

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1.4 SUBMITTAL SCHEDULE

- A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
 4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal Category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Architect's final release or approval.
 - g. Scheduled dates for purchasing.
 - h. Scheduled date of fabrication.
 - i. Scheduled dates for installation.
 - j. Activity or event number.

1.5 SUBMITTAL FORMATS

- A. Submittal Information: Include the following information in each submittal:
1. Project name.
 2. Date.
 3. Name of Architect.
 4. Name of Contractor.
 5. Name of firm or entity that prepared submittal.
 6. Names of subcontractor, manufacturer, and supplier.
 7. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier; and alphanumeric suffix for resubmittals.
 8. Category and type of submittal.

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9. Submittal purpose and description.
10. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
11. Drawing number and detail references, as appropriate.
12. Indication of full or partial submittal.
13. Other necessary identification.
14. Remarks.
15. Signature of transmitter.

B. Options: Identify options requiring selection by Architect.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. PDF Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

1.6 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Email: Prepare submittals as PDF package, and transmit to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.
 - a. Architect will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

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- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 1. Initial Review: Allow 7 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 - 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 - 3. Resubmittal Review: Allow 7 days for review of each resubmittal.
 - 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 14 days for initial review of each submittal.

- D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 - 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

- E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

- F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.7 SUBMITTAL REQUIREMENTS

- A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
 - 2. Mark each copy of each submittal to show which products and options are applicable.
 - 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.

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4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams that show factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before Shop Drawings, and before or concurrent with Samples.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data unless submittal based on Architect's digital data drawing files is otherwise permitted.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 2. Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings in pdf format, unless otherwise indicated, on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
- C. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other materials.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
 - a. Project name and submittal number.
 - b. Generic description of Sample.
 - c. Product name and name of manufacturer.
 - d. Sample source.
 - e. Number and title of applicable Specification Section.
 - f. Specification paragraph number and generic name of each item.
 3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics, and identification information for record.

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4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return one set with options selected.
- D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- E. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.
- F. Certificates:
 1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
 2. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
 3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
 4. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
 5. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
 6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- G. Test and Research Reports:

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1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - a. Name of evaluation organization.
 - b. Date of evaluation.
 - c. Time period when report is in effect.
 - d. Product and manufacturers' names.
 - e. Description of product.
 - f. Test procedures and results.
 - g. Limitations of use.

1.8 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

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1.9 CONTRACTOR'S REVIEW

- A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp with handwritten or digital signature before submitting to Architect.
- B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, signed and approved for compliance with the Contract Documents.
 - 1. Architect will not review submittals received from Contractor that do not have Contractor's review, signature and approval.

1.10 ARCHITECT'S REVIEW

- A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required, and return it.
 - 1. PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action.
 - 2. Paper Submittals: Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Architect will return without review submittals received from sources other than Contractor.
- F. Submittals not required by the Contract Documents will be returned by Architect without action.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013300

SECTION 013516 - ALTERATION PROJECT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes special procedures for alteration work.

1.3 DEFINITIONS

- A. Alteration Work: This term includes remodeling, renovation, repair, and maintenance work performed within existing spaces or on existing surfaces as part of the Project.
- B. Consolidate: To strengthen loose or deteriorated materials in place.
- C. Design Reference Sample: A sample that represents the Architect's prebid selection of work to be matched; it may be existing work or work specially produced for the Project.
- D. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.
- E. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by Architect.
- F. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.
- G. Repair: To correct damage and defects, retaining existing materials, features, and finishes. This includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.
- H. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.
- I. Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.
- J. Reproduce: To fabricate a new item, accurate in detail to the original, and from either the same or a similar material as the original, unless otherwise indicated.

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- K. Retain: To keep existing items that are not to be removed or dismantled.
- L. Strip: To remove existing finish down to base material unless otherwise indicated.

1.4 COORDINATION

- A. Alteration Work Subschedule: A construction schedule coordinating the sequencing and scheduling of alteration work for entire Project, including each activity to be performed, and based on Contractor's Construction Schedule. Secure time commitments for performing critical construction activities from separate entities responsible for alteration work.
 - 1. Schedule construction operations in sequence required to obtain best Work results.
 - 2. Coordinate sequence of alteration work activities to accommodate the following:
 - a. Owner's continuing occupancy of portions of existing building.
 - b. Tests and inspections.
 - 3. Detail sequence of alteration work, with start and end dates.
 - 4. Utility Services: Indicate how long utility services will be interrupted. Coordinate shutoff, capping, and continuation of utility services.
 - 5. Use of elevator and stairs.
 - 6. Equipment Data: List gross loaded weight, axle-load distribution, and wheel-base dimension data for mobile and heavy equipment proposed for use in existing structure. Do not use such equipment without certification from Contractor's professional engineer that the structure can support the imposed loadings without damage.
- B. Pedestrian and Vehicular Circulation: Coordinate alteration work with circulation patterns within Project building(s) and site. Some work is near circulation patterns. Circulation patterns cannot be closed off entirely and in places can be only temporarily redirected around small areas of work. Plan and execute the Work accordingly.

1.5 PROJECT MEETINGS FOR ALTERATION WORK

- A. Preliminary Conference for Alteration Work: Before starting alteration work, conduct conference at Project site.
 - 1. Attendees: In addition to representatives of Owner, Architect, and Contractor, testing service representative, specialists, and chemical-cleaner manufacturer(s) shall be represented at the meeting.
 - 2. Agenda: Discuss items of significance that could affect progress of alteration work, including review of the following:
 - a. Alteration Work Subschedule: Discuss and finalize; verify availability of materials, specialists' personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Fire-prevention plan.

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- c. Governing regulations.
 - d. Areas where existing construction is to remain and the required protection.
 - e. Hauling routes.
 - f. Sequence of alteration work operations.
 - g. Storage, protection, and accounting for salvaged and specially fabricated items.
 - h. Existing conditions, staging, and structural loading limitations of areas where materials are stored.
 - i. Qualifications of personnel assigned to alteration work and assigned duties.
 - j. Requirements for extent and quality of work, tolerances, and required clearances.
 - k. Embedded work such as flashings and lintels, special details, collection of waste, protection of occupants and the public, and condition of other construction that affects the Work or will affect the work.
3. Reporting: Record conference results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from conference.
- B. Coordination Meetings: Conduct coordination meetings specifically for alteration work at weekly intervals. Coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: In addition to representatives of Owner, Architect, and Contractor, each specialist, supplier, installer, and other entity concerned with progress or involved in planning, coordination, or performance of alteration work activities shall be represented at these meetings. All participants at conference shall be familiar with Project and authorized to conclude matters relating to alteration work.
 2. Agenda: Review and correct or approve minutes of previous coordination meeting. Review other items of significance that could affect progress of alteration work. Include topics for discussion as appropriate to status of Project.
 - a. Alteration Work Subschedule: Review progress since last coordination meeting. Determine whether each schedule item is on time, ahead of schedule, or behind schedule. Determine how construction behind schedule will be expedited with retention of quality; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities are completed within the Contract Time.
 - b. Schedule Updating: Revise Contractor's Alteration Work Subschedule after each coordination meeting where revisions to schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each entity present, including review items listed in the "Preliminary Conference for Alteration Work" Paragraph in this article and the following:
 - 1) Interface requirements of alteration work with other Project Work.
 - 2) Status of submittals for alteration work.
 - 3) Access to alteration work locations.
 - 4) Effectiveness of fire-prevention plan.
 - 5) Quality and work standards of alteration work.
 - 6) Change Orders for alteration work.

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3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.6 INFORMATIONAL SUBMITTALS

- A. Fire-Prevention Plan: Submit 10 days before work begins.

1.7 QUALITY ASSURANCE

- A. Fire-Prevention Plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire-control devices during each phase or process. Coordinate plan with Owner's fire-protection equipment and requirements. Include fire-watch personnel's training, duties, and authority to enforce fire safety.
- B. Safety and Health Standard: Comply with ANSI/ASSE A10.6.

1.8 STORAGE AND HANDLING OF SALVAGED MATERIALS

- A. Salvaged Materials:
 1. Clean loose dirt and debris from salvaged items unless more extensive cleaning is indicated.
 2. Pack or crate items after cleaning; cushion against damage during handling. Label contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area off-site.
 5. Protect items from damage during transport and storage.
- B. Salvaged Materials for Reinstallation:
 1. Repair and clean items for reuse as indicated.
 2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make items functional for use indicated.
- C. Existing Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Architect, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after alteration and other construction work in the vicinity is complete.

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- D. Storage: Catalog and store items within a weathertight enclosure where they are protected from moisture, weather, condensation, and freezing temperatures.
 - 1. Identify each item for reinstallation with a nonpermanent mark to document its original location. Indicate original locations on plans, elevations, sections, or photographs by annotating the identifying marks.
 - 2. Secure stored materials to protect from theft.
- E. Storage Space:
 - 1. Arrange for off-site locations for storage and protection of salvaged material that cannot be stored and protected on-site.

1.9 FIELD CONDITIONS

- A. Survey of Existing Conditions: Record existing conditions that affect the Work by use of preconstruction photographs.
 - 1. Comply with requirements specified in Section 013233 "Photographic Documentation."
- B. Discrepancies: Notify Architect of discrepancies between existing conditions and Drawings before proceeding with removal and dismantling work.
- C. Size Limitations in Existing Spaces: Materials, products, and equipment used for performing the Work and for transporting debris, materials, and products shall be of sizes that clear surfaces within existing spaces, areas, rooms, and openings, including temporary protection.

PART 2 - PRODUCTS - (Not Used)

PART 3 - EXECUTION

3.1 PROTECTION

- A. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from alteration work.
 - 1. Use only proven protection methods, appropriate to each area and surface being protected.
 - 2. Provide temporary barricades, barriers, and directional signage to exclude the public from areas where alteration work is being performed.
 - 3. Erect temporary barriers to form and maintain fire-egress routes.
 - 4. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during alteration work.

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5. Contain dust and debris generated by alteration work, and prevent it from reaching the public or adjacent surfaces.
6. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
7. Protect floors and other surfaces along hauling routes from damage, wear, and staining.
8. Provide supplemental sound-control treatment to isolate demolition work from other areas of the building.

B. Temporary Protection of Materials to Remain:

1. Protect existing materials with temporary protections and construction. Do not remove existing materials unless otherwise indicated.
2. Do not attach temporary protection to existing surfaces except as indicated as part of the alteration work program.

C. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.

D. Utility and Communications Services:

1. Notify Owner, Architect, authorities having jurisdiction, and entities owning or controlling wires, conduits, pipes, and other services affected by alteration work before commencing operations.
2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for alteration work.
3. Maintain existing services unless otherwise indicated; keep in service, and protect against damage during operations. Provide temporary services during interruptions to existing utilities.

E. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify Architect immediately of inadequate drainage or blockage. Do not begin work in an area until the drainage system is functioning properly.

1. Prevent solids such as adhesive or mortar residue or other debris from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from alteration work.
2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.

3.2 PROTECTION FROM FIRE

A. General: Follow fire-prevention plan and the following:

1. Comply with NFPA 241 requirements unless otherwise indicated. Perform duties titled "Owner's Responsibility for Fire Protection."
2. Remove and keep area free of combustibles, including rubbish, paper, waste, and chemicals, unless necessary for the immediate work.

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- a. If combustible material cannot be removed, provide fire blankets to cover such materials.
- B. Heat-Generating Equipment and Combustible Materials: Comply with the following procedures while performing work with heat-generating equipment or combustible materials, including welding, torch-cutting, soldering, brazing, removing paint with heat, or other operations where open flames or implements using high heat or combustible solvents and chemicals are anticipated:
1. Obtain Owner's approval for operations involving use of open-flame or welding or other high-heat equipment. Notify Owner at least 72 hours before each occurrence, indicating location of such work.
 2. As far as practicable, restrict heat-generating equipment to shop areas or outside the building.
 3. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.
 4. Use fireproof baffles to prevent flames, sparks, hot gases, or other high-temperature material from reaching surrounding combustible material.
 5. Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
 6. Fire Watch: Before working with heat-generating equipment or combustible materials, station personnel to serve as a fire watch at each location where such work is performed. Fire-watch personnel shall have the authority to enforce fire safety. Station fire watch according to NFPA 51B, NFPA 241, and as follows:
 - a. Train each fire watch in the proper operation of fire-control equipment and alarms.
 - b. Prohibit fire-watch personnel from other work that would be a distraction from fire-watch duties.
 - c. Cease work with heat-generating equipment whenever fire-watch personnel are not present.
 - d. Have fire-watch personnel perform final fire-safety inspection each day beginning no sooner than 30 minutes after conclusion of work in each area to detect hidden or smoldering fires and to ensure that proper fire prevention is maintained.
 - e. Maintain fire-watch personnel at each area of Project site until 60 minutes after conclusion of daily work.
- C. Fire-Control Devices: Provide and maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for the type of fire risk in each work area. Ensure that nearby personnel and the fire-watch personnel are trained in fire-extinguisher and blanket use.
- D. Sprinklers: Where sprinkler protection exists and is functional, maintain it without interruption while operations are being performed. If operations are performed close to sprinklers, shield them temporarily with guards.
1. Remove temporary guards at the end of work shifts, whenever operations are paused, and when nearby work is complete.

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3.3 PROTECTION DURING APPLICATION OF CHEMICALS

- A. Protect motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm or spillage resulting from applications of chemicals and adhesives.
- B. Cover adjacent surfaces with protective materials that are proven to resist chemicals selected for Project unless chemicals being used will not damage adjacent surfaces as indicated in alteration work program. Use covering materials and masking agents that are waterproof and UV resistant and that will not stain or leave residue on surfaces to which they are applied. Apply protective materials according to manufacturer's written instructions. Do not apply liquid masking agents or adhesives to painted or porous surfaces. When no longer needed, promptly remove protective materials.
- C. Do not apply chemicals during winds of sufficient force to spread them to unprotected surfaces.
- D. Neutralize alkaline and acid wastes and legally dispose of off Owner's property.
- E. Collect and dispose of runoff from chemical operations by legal means and in a manner that prevents soil contamination, soil erosion, undermining of paving and foundations, damage to landscaping, or water penetration into building interior.

3.4 GENERAL ALTERATION WORK

- A. Have specialty work performed only by qualified specialists.
- B. Ensure that supervisory personnel are present when work begins and during its progress.
- C. Record existing work before each procedure (preconstruction), and record progress during the work. Use digital preconstruction documentation photographs. Comply with requirements in Section 013233 "Photographic Documentation."
- D. Perform surveys of Project site as the Work progresses to detect hazards resulting from alterations.
- E. Notify Architect of visible changes in the integrity of material or components whether from environmental causes including biological attack, UV degradation, freezing, or thawing or from structural defects including cracks, movement, or distortion.
 - 1. Do not proceed with the work in question until directed by Architect.

END OF SECTION 013516

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.
- B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.4 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

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- C. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:
 - 1. Locations of dust-control partitions at each phase of work.
 - 2. HVAC system isolation schematic drawing.
 - 3. Location of proposed air-filtration system discharge.
 - 4. Waste-handling procedures.
 - 5. Other dust-control measures.

1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch-thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts, with 1-5/8-inch-OD top and bottom rails. Provide galvanized-steel bases for supporting posts.
- B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.
- C. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats minimum 36 by 60 inches.
- D. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

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2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Owner will provide conditioned interior space for field offices for duration of Project.
- B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
 - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
 - 1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.3 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.

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1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- D. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- E. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed.
 - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
 - b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
 2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
- F. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- H. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install WiFi cell phone access equipment and one land-based telephone line(s) for each field office.
 1. At each telephone, post a list of important telephone numbers.

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- a. Police and fire departments.
- b. Ambulance service.
- c. Contractor's home office.
- d. Contractor's emergency after-hours telephone number.
- e. Architect's office.
- f. Engineers' offices.
- g. Owner's office.
- h. Principal subcontractors' field and home offices.

3.4 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

C. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

D. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

E. Project Signs: Provide Project signs. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as required by Owner.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

a. Provide temporary, directional signs for construction personnel and visitors.

3. Maintain and touch up signs so they are legible at all times.

F. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

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- G. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."
- H. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- I. Existing Elevator Use: Use of Owner's existing elevators will be permitted, provided elevators are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life. Use of existing elevators is limited to Contractor personnel and transporting small hand tools. Contractor shall not be permitted to use existing elevators for the transport of materials.
 - 1. Do not load elevators beyond their rated weight capacity.
 - 2. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.
- J. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
 - 1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
 - 1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - 1. Comply with work restrictions specified in Section 011000 "Summary."

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- C. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.
- D. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- E. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- F. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner and tenants from fumes and noise.
 - 1. Construct dustproof partitions with two layers of 6-mil polyethylene sheet on each side. Cover floor with two layers of 6-mil polyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.
 - a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches between doors. Maintain water-dampened foot mats in vestibule.
 - 2. Insulate partitions to control noise transmission to occupied areas.
 - 3. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
 - 4. Protect air-handling equipment.
 - 5. Provide walk-off mats at each entrance through temporary partition.
- G. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
 - 1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 - 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

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3.6 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 - 3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved by Architect through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification.
- C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named

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product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications. Submit a comparable product request, if applicable.

1.4 ACTION SUBMITTALS

- A. Comparable Product Request Submittal: Submit request for consideration of each comparable product. Identify basis-of-design product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
 2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Form of Architect's Approval of Submittal: As specified in Section 013300 "Submittal Procedures."
 - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.
- B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.
1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.

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2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:
 - a. Name of product and manufacturer.
 - b. Model and serial number.
 - c. Capacity.
 - d. Speed.
 - e. Ratings.
3. See individual identification sections in Divisions 21, 23, 26 and 28 for additional identification requirements.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:
 1. Store products to allow for inspection and measurement of quantity or counting of units.
 2. Store materials in a manner that will not endanger Project structure.
 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
 4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
 5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 6. Protect stored products from damage and liquids from freezing.
 7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

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1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 - 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 - 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
 - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 - 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
 - 3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
 - 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 - 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 - 3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
 - 4. Where products are accompanied by the term "as selected," Architect will make selection.
 - 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
 - 6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

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- a. Submit additional documentation required by Architect in order to establish equivalency of proposed products. Evaluation of "or equal" product status is by the Architect, whose determination is final.

B. Product Selection Procedures:

1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - a. Sole product may be indicated by the phrase: "Subject to compliance with requirements, provide the following: ..."
2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - a. Sole manufacturer/source may be indicated by the phrase: "Subject to compliance with requirements, provide products by the following: ..."
3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - a. Limited list of products may be indicated by the phrase: "Subject to compliance with requirements, provide one of the following: ..."
4. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, which complies with requirements.
 - a. Non-limited list of products is indicated by the phrase: "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following: ..."
5. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - a. Limited list of manufacturers is indicated by the phrase: "Subject to compliance with requirements, provide products by one of the following: ..."
6. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, which complies with requirements.

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- a. Non-limited list of manufacturers is indicated by the phrase: "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following: ..."
7. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. Visual Matching Specification: Where Specifications require "match Architect's sample or match existing conditions," provide a product that complies with requirements and matches Architect's sample or existing conditions. Architect's decision will be final on whether a proposed product matches.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
 1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant product qualities include attributes such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
 2. Evidence that proposed product provides specified warranty.
 3. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 4. Samples, if requested.
- B. Submittal Requirements: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Installation of the Work.
 - 2. Cutting and patching.
 - 3. Progress cleaning.
 - 4. Starting and adjusting.
 - 5. Protection of installed construction.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for limits on use of Project site.
 - 2. Section 013300 "Submittal Procedures" for submitting surveys.
 - 3. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.
 - 4. Section 024119 "Selective Demolition" for demolition and removal of selected portions of the building.
 - 5. Drawing A0 "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.4 PREINSTALLATION MEETINGS

- A. Cutting and Patching Conference: Conduct conference at Project site.

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1. Prior to commencing work requiring cutting and patching, review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:
 - a. Contractor's superintendent.
 - b. Trade supervisor responsible for cutting operations.
 - c. Trade supervisor(s) responsible for patching of each type of substrate.
 - d. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affecting by cutting and patching operations.
2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer.
- B. Certificates: Submit certificate signed by professional engineer certifying that location and elevation of improvements comply with requirements.
- C. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
 3. Products: List products to be used for patching and firms or entities that will perform patching work.
 4. Dates: Indicate when cutting and patching will be performed.
 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
 - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

1.6 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding.

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Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate

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and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services; and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

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- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Where possible, select tools or equipment that minimize production of excessive noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

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- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Repair or remove and replace damaged, defective, or nonconforming Work.
 - 1. Comply with Section 017700 "Closeout Procedures" for repairing or removing and replacing defective Work.

3.4 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.

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4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 6. Proceed with patching after construction operations requiring cutting are complete.
- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.5 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

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1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

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3.6 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 019113 "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.7 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.
- C. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous demolition and construction waste.
 - 2. Recycling nonhazardous demolition and construction waste.
 - 3. Disposing of nonhazardous demolition and construction waste.

1.3 DEFINITIONS

- A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.
- C. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner's property.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 MATERIALS OWNERSHIP

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

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PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 - 1. Comply with operation, termination, and removal requirements in Section 015000 "Temporary Facilities and Controls."
- B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
- C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged and recycled.
 - 2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

- A. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - 3. Store items in a secure area until installation.
 - 4. Protect items from damage during transport and storage.
 - 5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- B. Salvaged Items for Owner's Use: Salvage items for Owner's use and handle as follows:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to Owner's storage area off-site as designated by Owner.

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5. Protect items from damage during transport and storage.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.
- C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
 1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 4. Store components off the ground and protect from the weather.
 5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor as often as required to prevent overfilling bins.

3.4 RECYCLING DEMOLITION WASTE

- A. Piping: Reduce piping to straight lengths and store by material and size. Separate supports, hangers, valves, sprinklers, and other components by material and size.
- B. Conduit: Reduce conduit to straight lengths and store by material and size.

3.5 RECYCLING CONSTRUCTION WASTE

- A. Packaging:
 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.

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2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
 - a. Comply with requirements in Section 329300 "Plants" for use of clean sawdust as organic mulch.

C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.
 - a. Comply with requirements in Section 329300 "Plants" for use of clean ground gypsum board as inorganic soil amendment.

D. Paint: Seal containers and store by type.

3.6 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged or recycled, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

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

B. General: Except for items or materials to be salvaged or recycled, remove waste materials and legally dispose of at designated spoil areas on Owner's property.

C. Burning: Do not burn waste materials.

END OF SECTION 017419

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
 - 5. Repair of the Work.
- B. Related Requirements:
 - 1. Section 013233 "Photographic Documentation" for submitting final completion construction photographic documentation.
 - 2. Section 017823 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
 - 3. Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 4. Section 017900 "Demonstration and Training" for requirements to train the Owner's maintenance personnel to adjust, operate, and maintain products, equipment, and systems.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of cleaning agent.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at final completion.

1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.

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B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.
5. Submit testing, adjusting, and balancing records.
6. Submit sustainable design submittals not previously submitted.
7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

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1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
6. Advise Owner of changeover in utility services.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements.
10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.
5. Submit final completion photographic documentation.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of

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unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Page number.
4. Submit list of incomplete items in the following format:
 - a. MS Excel electronic file. Architect will return annotated file.

1.9 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
- D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

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1. Submit on digital media acceptable to Architect by email to Architect.
- E. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural

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weathering of exterior surfaces. Restore reflective surfaces to their original condition.

- g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
 - p. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
 - q. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.
- D. Construction Waste Disposal: Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair, or remove and replace, defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
 - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
 - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.

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- a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory manuals.
 - 2. Emergency manuals.
 - 3. Systems and equipment operation manuals.
 - 4. Systems and equipment maintenance manuals.
 - 5. Product maintenance manuals.
- B. Related Requirements:
 - 1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

- A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Architect and Commissioning Authority will comment on whether content of operation and maintenance submittals is acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

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- B. Format: Submit operation and maintenance manuals in the following format:
 - 1. Submit on digital media acceptable to Architect by email to Architect. Enable reviewer comments on draft submittals.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect and Commissioning Authority will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect and Commissioning Authority will return copy with comments.
 - 1. Correct or revise each manual to comply with Architect's and Commissioning Authority's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's and Commissioning Authority's comments and prior to commencing demonstration and training.
- E. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.5 FORMAT OF OPERATION AND MAINTENANCE MANUALS

- A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
 - 1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 - 2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

1.6 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of contents.
 - 3. Manual contents.

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- B. Title Page: Include the following information:
1. Subject matter included in manual.
 2. Name and address of Project.
 3. Name and address of Owner.
 4. Date of submittal.
 5. Name and contact information for Contractor.
 6. Name and contact information for Construction Manager.
 7. Name and contact information for Architect.
 8. Name and contact information for Commissioning Authority.
 9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 10. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

1.7 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:
1. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
 2. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
 3. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

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1.8 EMERGENCY MANUALS

- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- B. Content: Organize manual into a separate section for each of the following:
 - 1. Type of emergency.
 - 2. Emergency instructions.
 - 3. Emergency procedures.
- C. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
 - 1. Fire.
 - 2. Flood.
 - 3. Gas leak.
 - 4. Water leak.
 - 5. Power failure.
 - 6. Water outage.
 - 7. System, subsystem, or equipment failure.
 - 8. Chemical release or spill.
- D. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- E. Emergency Procedures: Include the following, as applicable:
 - 1. Instructions on stopping.
 - 2. Shutdown instructions for each type of emergency.
 - 3. Operating instructions for conditions outside normal operating limits.
 - 4. Required sequences for electric or electronic systems.
 - 5. Special operating instructions and procedures.

1.9 SYSTEMS AND EQUIPMENT OPERATION MANUALS

- A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

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- B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 2. Performance and design criteria if Contractor has delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.
 8. Piped system diagrams.
 9. Precautions against improper use.
 10. License requirements including inspection and renewal dates.
- C. Descriptions: Include the following:
1. Product name and model number. Use designations for products indicated on Contract Documents.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves.
 8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.
- D. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
 2. Equipment or system break-in procedures.
 3. Routine and normal operating instructions.
 4. Regulation and control procedures.
 5. Instructions on stopping.
 6. Normal shutdown instructions.
 7. Seasonal and weekend operating instructions.
 8. Required sequences for electric or electronic systems.
 9. Special operating instructions and procedures.
- E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- F. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

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1.10 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.
- C. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:
1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- E. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.

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5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training video recording, if available.
- F. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- G. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- H. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- I. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.
- J. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
1. Do not use original project record documents as part of maintenance manuals.
- 1.11 PRODUCT MAINTENANCE MANUALS
- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D. Product Information: Include the following, as applicable:

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1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

E. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.
4. Miscellaneous record submittals.

- B. Related Requirements:

1. Section 017300 "Execution" for final property survey.
2. Section 017700 "Closeout Procedures" for general closeout procedures.
3. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:

1. Number of Copies: Submit copies of record Drawings as follows:

- a. Initial Submittal:

- 1) Submit PDF electronic files of scanned record prints and one of file prints.
- 2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.

- b. Final Submittal:

- 1) Submit record digital data files and three set(s) of record digital data file plots.
- 2) Plot each drawing file, whether or not changes and additional information were recorded.

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- B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.

1.4 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
 - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding photographic documentation.
 - 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.

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3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
 2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
 3. Refer instances of uncertainty to Architect for resolution.
 4. Architect will furnish Contractor with one set of digital data files of the Contract Drawings for use in recording information.
 - a. See Section 013100 "Project Management and Coordination" for requirements related to use of Architect's digital data files.
 - b. Architect will provide data file layer information. Record markups in separate layers.
- C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Format: Annotated PDF electronic file with comment function enabled.
 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 4. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect.
 - e. Name of Contractor.

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1.5 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 - 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 - 4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
 - 5. Note related Change Orders, record Product Data, and record Drawings where applicable.
- B. Format: Submit record Specifications as annotated PDF electronic file.

1.6 RECORD PRODUCT DATA

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 - 3. Note related Change Orders, record Specifications, and record Drawings where applicable.
- C. Format: Submit record Product Data as annotated PDF electronic file.
 - 1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

1.7 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as PDF electronic file.

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1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

1.8 MAINTENANCE OF RECORD DOCUMENTS

- A. Maintenance of Record Documents: Store record documents in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Instruction in operation and maintenance of systems, subsystems, and equipment.
 - 2. Demonstration and training video recordings.

1.3 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
 - 1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.
- B. Qualification Data: For facilitator and/or instructor.
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.
- D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 CLOSEOUT SUBMITTALS

- A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
 - 1. Identification: On each copy, provide an applied label with the following information:

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- a. Name of Project.
 - b. Name and address of videographer.
 - c. Name of Architect.
 - d. Name of Construction Manager.
 - e. Name of Contractor.
 - f. Date of video recording.
2. Transcript: Prepared and bound in format matching operation and maintenance manuals. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding video recording. Include name of Project and date of video recording on each page.
 3. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.
 4. At completion of training, submit complete training manual(s) for Owner's use prepared in same paper and PDF file format required for operation and maintenance manuals specified in Section 017823 "Operation and Maintenance Data."

1.5 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.
- D. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
 1. Inspect and discuss locations and other facilities required for instruction.
 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
 3. Review required content of instruction.
 4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

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1.6 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data have been reviewed and approved by Architect.

1.7 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 - 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Systems and equipment operation manuals.
 - c. Systems and equipment maintenance manuals.
 - d. Product maintenance manuals.
 - e. Project Record Documents.
 - f. Identification systems.
 - g. Warranties and bonds.
 - h. Maintenance service agreements and similar continuing commitments.
 - 3. Emergencies: Include the following, as applicable:

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- a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
- a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
- a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
- a. Diagnostic instructions.
 - b. Test and inspection procedures.
7. Maintenance: Include the following:
- a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning.
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
8. Repairs: Include the following:
- a. Diagnosis instructions.

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- b. Repair instructions.
- c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
- d. Instructions for identifying parts and components.
- e. Review of spare parts needed for operation and maintenance.

1.8 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."
- B. Set up instructional equipment at instruction location.

1.9 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
 - 2. Owner will furnish an instructor to describe Owner's operational philosophy.
 - 3. Owner will furnish Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - 1. Schedule training with Owner, through Architect, with at least seven days' advance notice.
- D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a written performance-based test.
- F. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

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1.10 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

- A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
 - 1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- B. Digital Video Recordings: Provide high-resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full HD modewith vibration reduction technology.
 - 1. Submit video recordings on CD-ROM or thumb drive.
 - 2. File Hierarchy: Organize folder structure and file locations according to Project Manual table of contents. Provide complete screen-based menu.
 - 3. File Names: Utilize file names based on name of equipment generally described in video segment, as identified in Project specifications.
 - 4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the equipment demonstration and training recording that describes the following for each Contractor involved on the Project, arranged according to Project Manual table of contents:
 - a. Name of Contractor/Installer.
 - b. Business address.
 - c. Business phone number.
 - d. Point of contact.
 - e. Email address.
- C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.
 - 1. Film training session(s) in segments not to exceed 15 minutes.
 - a. Produce segments to present a single significant piece of equipment per segment.
 - b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
 - c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.
- D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.
 - 1. Furnish additional portable lighting as required.
- E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.

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- F. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.
- G. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 017900

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

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

B. Related Requirements:

1. Section 011000 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Section 017300 "Execution" for cutting and patching procedures.
3. Section 013516 "Alteration Project Procedures" for general protection and work procedures for alteration projects.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

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1.4 MATERIALS OWNERSHIP

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

1.5 PREINSTALLATION MEETINGS

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

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property for dust control, for noise control. Indicate proposed locations and construction of barriers.
- C. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's building manager's and other tenants' on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of elevator and stairs.
 - 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- D. Predemolition Photographs: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before Work begins.
- E. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

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1.7 CLOSEOUT SUBMITTALS

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

1.8 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. Hazardous materials will be removed by Owner before start of the Work.
 - 2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.9 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
 - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- D. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
- E. Survey of Existing Conditions: Record existing conditions by use of measured drawings preconstruction photographs or video and templates.
 - 1. Comply with requirements specified in Section 013233 "Photographic Documentation."
 - 2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
 - 3. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 PREPARATION

- A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

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1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. Arrange to shut off utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.4 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 5. Maintain fire watch during and for at least one hour after flame-cutting operations.
 6. Maintain adequate ventilation when using cutting torches.
 7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 10. Dispose of demolished items and materials promptly. Comply with requirements in Section 017419 "Construction Waste Management and Disposal."
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Removed and Salvaged Items:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area off-site as designated by Owner.
 5. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.

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4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

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

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.

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

C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove. Core drill in designated locations for passage of utility piping.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal."

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

3.8 CLEANING

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

END OF SECTION 024119

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Penetrations in fire-resistance-rated walls.
 - 2. Penetrations in horizontal assemblies.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

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1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.9 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Requirements:
 - 1. Contractor shall insure that all trades utilize the same product manufacturer for all firestopping systems.
- B. Fire-Test-Response Characteristics:
 - 1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestopping systems shall bear one of the following classification markings of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."
 - 2) Intertek Group in its "Directory of Listed Building Products."

- 3) FM Global in its "Building Materials Approval Guide."

2.2 PENETRATION FIRESTOPPING SYSTEMS

- A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any. Contractor shall select one of the following manufacturers
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Fire Protection Products.
 - b. Hilti, Inc.
 - c. Tremco, Inc.
- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
 1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
 1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
 2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
- D. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E84.
- E. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.
 1. Permanent forming/damming/backing materials.
 2. Substrate primers.
 3. Collars.
 4. Steel sleeves.

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2.3 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.
- E. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

2.4 MIXING

- A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

- A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- C. Install fill materials by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.

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2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

- A. Contractor will engage a qualified testing agency to perform tests and inspections according to ASTM E2174.
- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.5 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

END OF SECTION 078413

SECTION 21 00 00

FIRE PROTECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

1.2 DEFINITIONS

- A. Owner shall mean San Antonio Housing Authority (SAHA)
- B. Architect shall mean Raba Kistner, Inc. (RKCI)
- C. Contractor shall mean a licensed General Contractor awarded the project who is responsible for all Work required as part of this project.
- D. Fire Protection Engineer of Record or FPE shall mean Fire Protection Consulting Group, LLC (FPCG).
- E. CAD based drawings shall be provided in “.dwg” format and shall include all externally referenced blocks, fonts, dimension styles, and shape files used to provide a complete CAD document. All drawings shall be compatible with AutoCAD release 2013.
- F. Authority Having Jurisdiction (AHJ): City of San Antonio Development Services (CoSA)
- G. Approved: Acceptable to the Authority Having Jurisdiction and FPE
- H. Listed: Equipment or materials included in a list published by an organization that is acceptable to the AHJ, and concerned with evaluation of products that maintains periodic inspection of production of listed products whose listing states that either the equipment or material meets appropriate designated standards or has been tested and found suitable for a specified purpose.

1.3 SCOPE

The scope and work shall include the design and installation of complete automatic sprinkler protection throughout the designated building.

The Fire Protection Contractor shall provide the Owner with a periodic plan for the testing of the system's water.

1.4 WORK INCLUDED

- A. Include the following Work in addition to items normally part of this Section:
 - 1. Fire Department connections,
 - 2. Heat Tracing for Fire Suppression Piping
 - 3. Fire Suppression Systems Insulation.

1.5 RELATED WORK

- A. Section 21 00 00 – Fire Protection
- B. Section 21 05 29 – Hangers and Supports for Fire Suppression Piping

- C. Section 21 05 33 – Heat Tracing for Fire Suppression Piping
- D. Section 21 07 19 – Fire Suppression Systems Insulation
- E. Section 21 13 13 – Wet Pipe Sprinkler Systems
- F. Section 21 31 13 – Centrifugal Fire Pump

1.6

1.7 REGULATORY CODES

A. WORK IN ACCORDANCE WITH:

- 1. NFPA 13, Standard for the Installation of Sprinkler Systems, 2013 edition.
- 2. NFPA 20, Standard for the Installation of Stationary Fire Pumps for Fire Protection
- 3. NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances, 2013 edition.
- 4. NFPA 25, Standard for the Inspection, Testing and Maintenance of Water-based Fire Protection Systems, 2014 edition
- 5. NFPA 70, National Electrical Code, 2014 edition.
- 6. NFPA 72, National Fire Alarm Code, 2013 edition.
- 7. International Building Code (IBC), 2015 edition with City of San Antonio (CoSA) Amendments.
- 8. International Fire Code (IFC), 2015 edition with CoSA Amendments.
- 9. Texas Insurance Code, Chapter 6003 (formerly Article 5.43-3), Fire Protection Sprinkler System Service and Installation & 28 TAC §§ 34.700 the Fire Sprinkler Rules, Summer 2016.
- 10. FM Global Fire Protection Approval Guide, 2016 edition.
- 11. Underwriters Laboratories (UL) Fire Protection Equipment Directory, 2016 edition.
- 12. Other Nationally Recognized Testing Laboratory (NRTL).
- 13. Any conflicts between the referenced codes and this specification shall be brought to the attention of the Architect and Contractor for interpretation.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Acceptance at Site

- 1. Contractor shall inspect all material upon arrival at the site. Any defective or damaged material shall be immediately removed from site and replaced with properly operating and serviceable equipment.

B. Storage and Protection

- 1. Contractor shall provide for secure storage on the site at a location approved by the Owner

1.9 WARRANTY

- A. All workmanship, materials, and equipment furnished under this contract shall be free from defects in workmanship and materials under normal use and service for a period, and under the terms, specified in Division 0 and 1, General Conditions, and Supplementary Conditions. The equipment manufacturer shall be represented by a local service company, and the name shall be furnished to the Owner.

1.10 MAINTENANCE

- A. The automatic sprinkler contractor shall include a maintenance contract for the term of one (1) year beginning from the date of final acceptance by the Architect.
- B. Contractor is to furnish extra materials as follows:
 - 1. Sprinklers: No less than six of each type of head used in the facility with all quantities complying with Section 6.2.9.5 of NFPA 13, depending on the number of heads installed

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- in the New Tower.
2. Stock of spare sprinklers shall be kept in a location that will never exceed 100 degrees F. A list of all types of sprinkler heads installed in the New Tower shall be included with the stock and shall include the number of each type to be stocked. The list shall also include all information required by Section 6.2.9.7 of NFPA 13.
 3. One of each type of special sprinkler wrench required for each different type of sprinkler head.

PART 2 - PRODUCTS

2.1 AUTOMATIC SPRINKLER SYSTEM

A. VALVES:

1. FLOOR CONTROL VALVES:
2. ALARM VALVES: Wet-pipe. Shotgun type with gauges and 2" main drain. Grooved type.
3. GATE VALVES: Provide butterfly valves with integral tamper switches. Grooved type.
4. CHECK VALVES: Provide grooved type, bronze mounted check valves.

B. PIPING:

1. All piping associated with the automatic sprinkler system shall be schedule 10 or 40 black steel pipes with Victaulic groove couplings.
2. Pipe shall be pre-treated by the manufacturer to resist microbiologically induced corrosion (MIC).

C. FITTINGS:

1. Fittings may be grooved type as permitted per NFPA 13. Diameter not limited.
2. Thread fittings shall be cast or malleable iron rated for 300 psi, as permitted by NFPA 13.

2.2 FIRE DEPARTMENT CONNECTION

A. APPROVED MANUFACTURERS: This specification is based on the first named, other listed below are approved.

1. Potter-Roemer, Inc.
2. Allen.
3. Elkhart.
4. Croker.

B. WALL MOUNTED FDC: Two existing FDC connections to be replaced with Four 2-1/2" inlets connection at each connection, individual clappers, caps and chains. Rough brass. Check valve in vault. Backplate states "AUTO SPRINKLER AND STANDPIPE".

C. CONNECTION THREADS: Conforming to San Antonio Fire Department requirements.

PART 3 - EXECUTION

3.1 DESIGN

A. The Contractor shall conform to the applicable ICC codes, NFPA standards and CoSA amendments as referenced in Section 1.4, A.

3.2 INSTALLATION

A. Install all items in accordance with applicable ICC codes, NFPA standards and CoSA

- amendments as referenced in Section 1.4, A.
- B. All applicable practices and procedures, as required per the referenced codes, standards, and the AHJ, shall be implemented to ensure the proper installation of a fully operational, compliant system.
 - C. Comply with all appropriate safety guidelines and precautions to accomplish the work without injury to personnel or damage to any building components or contents.
 - D. Wall or floor penetrations shall be neatly patched. Coordinate materials and method of sealing new openings for pipe in partitions and floors.
 - E. Penetrations through fire rated walls shall be sealed with approved fire resistive materials and/or assemblies. Material and assemblies shall be suitable for the hourly rating of the penetrated construction element.
 - F. All piping shall be free of rust and debris inside and out.
 - G. Run piping concealed above ceilings. Exact routing of piping shall be coordinated with new and existing conditions and affected disciplines.

 - H. The contractor shall adhere to all construction phasing as determined by the Architect and General Contractor. Contractor shall maintain coordination with all Architectural, Structural and MEP disciplines.

3.3 REPLACEMENT

Upon receipt of written notice of failure of any part of the guaranteed equipment during the guaranteed period, the Contractor will replace the affected part or parts promptly at no additional cost.

3.4 TESTING

Upon completion of the installation, test the system and obtain approval of the fire department and Owner's fire insurance rating organization. The Contractor shall be completely responsible for coordinating the final inspection and testing with the AHJ. As-built drawings shall be provided prior to this event.

3.5 TRAINING

- A. Owner's personnel shall be trained in the normal start-up of the system, operation, normal and emergency shutdown, and maintenance of the system.
- B. Routine maintenance, yearly maintenance, winterization, and spring start-up shall be fully discussed and documented.
- C. Names of those instructed and dates, as well as a list of information handed over to the owner, shall be included in the final report.

END OF SECTION

SECTION 21 05 29

HANGERS AND SUPPORTS FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Pipe hangers, supports and associated anchors.
- B. Sleeves and seals.

1.2 RELATED WORK

- A. Section 21 00 00 – Fire Protection
- B. Section 21 05 33 – Heat Tracing for Fire Suppression Piping
- C. Section 21 07 19 – Fire Suppression Systems Insulation
- D. Section 21 13 13 – Wet Pipe Sprinkler Systems
- E. Section 21 31 13 – Centrifugal Fire Pump

1.3 REFERENCES

- A. Refer to Section 21 00 00, for applicable codes and standards.

1.4 QUALITY ASSURANCE

- A. Supports for Sprinkler Piping: In conformance with NFPA 13.

1.5 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Division One.
- B. Indicate hanger and support framing and attachment methods.

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

- A. Hangers and supports shall comply with NFPA 13 for type and materials.
- B. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods; cast iron roll and stand for pipe sizes 6 inches and over.
- C. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
- D. Wall Support for Pipe Sizes 4 Inches and over: adjustable steel yoke and cast iron roll.
- E. Vertical Support: Steel riser clamp.
- F. Floor Support for Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, locknut nipple, floor flange, and concrete pier or steel support.

- G. Floor Support for Pipe Sizes 6 Inches and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.

2.2 HANGER RODS

- A. Galvanized Hanger Rods: Continuous all thread.

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. UL listed for hanger systems.

2.4 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 or FM Approved Assemblies only.
- D. Fire Stopping: UL Listed or FM Approved Assemblies . Where assembly includes fire caulk, include paintable 25-year acrylic sealant.

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. Where concrete slabs form finished ceiling, provide inserts to be flush with slab surface.
- C. 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

- A. Support horizontal piping with prescribed rod size, hanger type, hanger location and intervals as prescribed per NFPA 13.
- B. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
- C. Place a hanger within the distance prescribed per NFPA 13 for each horizontal elbow and at the vertical horizontal transition.
- D. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.
- E. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- F. Support riser piping independently of connected horizontal piping.

- G. Install hangers with nut at base and above hanger; tighten upper nut to hanger after final installation adjustments.

3.3 Insulated Piping: Comply with the following installation requirements.

- A. Refer to Specification Section 21 07 19.

3.4 EQUIPMENT BASES AND SUPPORTS

- A. Provide equipment bases of concrete, if applicable.
- 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 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 Thermafiber and 3M caulking and provide floor plate.
- C. Where piping 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 airtight and follow all requirements of the listed assembly. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- D. Fire protection sleeves shall be flush with floor of stairways.

END OF SECTION

SECTION 21 05 33

HEAT TRACING FOR FIRE SUPPRESSION PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. This is a specification for the installation of an electronically controlled, supervised, freeze protection system for fire suppression piping.
- B. The Contractor is responsible for the design, furnishing and installation of the following:
 - 1. Design and installation of a UL listed heat tracing system for protection of fire suppression pipe exposed to freezing conditions.
 - 2. The heat tracing system shall be designed and installed in coordination with the new insulation system under Specification Section 21 07 19 – Fire Suppression Piping Insulation.
 - 3. Heating equipment furnished under this section shall be supplied by a single manufacturer.

1.2 REFERENCES

- A. Refer to Section 21 00 00 for applicable codes, standards and guidelines.
- B. Underwriters Laboratories (UL):
 - 1. UL 515, Standard for Electrical Resistance Trace Heating for Commercial Applications, 2015 edition.
- C. Code Conflicts:
 - 1. Any conflicts between the referenced codes and this specification shall be brought to the attention of the Architect and Contractor for interpretation.

1.3 DEFINITIONS

- A. Owner shall mean San Antonio Housing Authority (SAHA)
- B. Architect shall mean Raba Kistner, Inc. (RKCI)
- C. Contractor shall mean a licensed General Contractor awarded the project who is responsible for all Work required as part of this project.
- D. Fire Protection Engineer of Record or FPE shall mean Fire Protection Consulting Group, LLC (FPCG).
- E. Sub-contractor or installing contractor shall mean a company specializing in heat tracing system design and installation with at least 5 years documented, relevant experience.

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- F. CAD based drawings shall be provided in “.dwg” format and shall include all externally referenced blocks, fonts, dimension styles, and shape files used to provide a complete CAD document. All drawings shall be compatible with AutoCAD release 2013.
- G. Authority Having Jurisdiction (AHJ): City of San Antonio Development Services (CoSA)
- H. Approved: Acceptable to the Authority Having Jurisdiction and FPE
- I. Listed: Equipment or materials included in a list published by an organization that is acceptable to the AHJ, and concerned with evaluation of products that maintains periodic inspection of production of listed products whose listing states that either the equipment or material meets appropriate designated standards or has been tested and found suitable for a specified purpose.

1.4 SYSTEM DESCRIPTION

- A. The heat tracing system shall be a complete installation providing freeze protection consisting of self-regulating cable, connection kits and electronic controller which complies with NFPA 13 requirements. Work shall be in accordance with the codes and standards and their annexes / appendices referenced in Paragraph 1.2 of this specification and as indicated.
- B. The Contractor shall provide design, labor, materials, and equipment for the following as indicated and described herein:
 - 1. A complete heat tracing system for piping exposed outdoors to freezing conditions.
 - 2. Pipe shall maintain 45°F during freezing ambient temperatures down to 5°F.
 - 3. System shall provide ambient sensing control, temperature monitoring, fire alarm supervisory contacts and ground fault circuit protection.
 - 4. Pipe heat loss calculations, prepared by the manufacturer or certified representative, shall include insulation and appurtenances, as specified in Section 21 07 19, for selection of appropriate cable and components.
 - 5. Refer to Division 01 for the procedural requirements for project record documents, operation and maintenance manuals, warranties and spare parts.
 - 6. Verification of all existing conditions pertinent to the scope of this work shall be required.

1.5 SUBMITTALS

- A. All submittals must be reviewed and approved by the Architect prior to submitting to the AHJ for a permit. Sub-contractor shall not commence installation work without explicit authorization by the Contractor.
 - 1. Submittals shall include the following documentation and shall comply with the project submittal requirements as specified in Division 01:
 - a. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories. Product data shall be provided in a separate bound book of 8-1/2” x 11” pages. Submit data for all equipment.
 - b. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work per applicable standards. Plans shall be full-size on minimum 24” x 36” sheets drawn to a scale no smaller than 1/8” = 1’-0”. Submit installation details and wiring diagrams.
 - c. Pipe heat loss calculation to demonstrate the following: Tm – Maintain temperature of 45°F; Ta – Minimum expected ambient temperature of 5°F; Pipe material; Thermal insulation type and thickness.

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- d. Provide three hard copies of all submittals to the Architect for distribution. All submittals will be reviewed by the FPE and returned and noted with the applicable status (Accepted/Rejected).

B. Close Out Documentation

1. The Owner, Contractor, Architect and FPE shall each be provided with the following documents and all project record documents and manuals as specified in Division 01:
 - a. As-built drawings.
 - b. Electronic set of AutoCAD based drawings on Windows formatted CD-ROM. AutoCAD release 2013 format.
 - c. Operation and maintenance manuals. The data shall include a plain language description of the system and operating sequence, manufacturer's technical data, and data sheets for all installed equipment.
 - d. Original test certificates and approvals by the AHJ.

1.6 QUALITY ASSURANCE

A. Qualifications

1. Work shall be performed by a company and personnel specializing in heat trace system application with not less than 5 years documented, relevant experience.
2. Cable and tape shall only be applied when all surfaces are clean, dry, free of dirt, duct, grease, oil, frost, moisture or other elements.
3. Work shall be performed at the temperatures recommended by the manufacturer. Do not install products under environmental conditions outside the manufacturer's limits.

B. Pre-Installation Conference

1. Prior to installation, the Contractor shall arrange a pre-installation conference with the Architect and Owner to identify potential installation issues and conflicts.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Acceptance at Site

1. Contractor shall inspect all material upon arrival at the site. Any defective or damaged material shall be immediately removed from site and replaced with properly operating and serviceable equipment.

B. Storage and Protection

1. Contractor shall provide for secure storage on the site at a location approved by the Owner.
2. Material shall be delivered in unbroken, factory furnished packaging and stored in a clean, dry indoor space which provides protection from the weather.

1.8 SCHEDULING AND SEQUENCING

- A. All sequencing and scheduling of installation and inspections be coordinated by the Contractor. Submit a schedule for completion of all work to the Owner for approval.

1.9 WARRANTY

- A. All workmanship, materials, and equipment furnished under this contract shall be free from defects in workmanship and materials under normal use and service for a period, and under the terms, specified in Division 0 and 1.
- B. The equipment manufacturer shall be represented by a local service company, and the name shall be furnished to the Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of design product: Raychem XL-Trace Freeze Protection System.
 - 1. RayChem by Pentair Corporation, 7433 Harwin Drive, Houston, Texas, 77036. Phone: 800-545-6258, Fax: 800-527-5703, www.pentairthermal.com
 - 2. Substitutions must be formally submitted and approved prior to order and installation.

2.2 SYSTEM COMPONENTS

- A. Heating Cable
 - 1. Raychem XL Trace Self-Regulating Heating cable:
 - a. Self Regulating cable construction shall consist of two 16 AWG nickel plated copper bus wires between which a positive temperature coefficient conductive polymer heating element is placed.
 - b. Tinned-copper braid with modified polyolefin (-CR) outer jacket.
 - c. Cable shall be terminated using an approved power connection and end termination kit.
 - d. Rayclic-PC power connection and end seal.
 - e. Rayclic-T tee kit with end seal.
 - f. Cable rating shall be 240 VAC.
- B. Control
 - 1. Raychem ACS-30 Multipoint Heat-Tracing System:
 - a. Control input voltages shall be 120 VAC.
 - b. Enclosure shall be NEMA 4X FRP.
 - c. Control shall have adjustable set point temperature range from 0° F to 200° F
 - d. Programmable key pad with digital display.
 - e. Control shall monitor pipe and ambient temperature.
 - f. Control shall have ground fault alarm.
 - g. Control shall have resistance temperature detector (RTD) failure alarm.
 - h. Control shall have low and high temperature alarm.
 - i. Control shall monitor current and have a low current alarm.
 - j. Floor by floor circuit monitoring control shall be:
 - 1) Raychem ACS-PCM2-5
- C. RTD Temperature Sensors
 - 1. Raychem Model RTD10CS
 - 2. Raychem Model RTD-200

- D. Accessories
 - 1. Model GT-66 glass tape, as specified by the manufacturer.
 - 2. "Electric-Traced" label.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. The Contractor must field verify all conditions prior to installation. Any inquiries or discrepancies shall be addressed to the Architect.

3.2 PREPARATION

- A. Install materials after piping has been tested and approved.
- B. Surface Preparation: Clean and dry surfaces to receive cable and glass tape. Remove materials that will adversely affect the heat trace system application.

3.3 INSTALLATION

- A. Practice and Procedures
 - 1. All applicable practices and procedures, as required per the referenced codes, standards, and the AHJ, shall be implemented to ensure the proper installation of a fully operational, compliant system.
 - 2. Comply with all appropriate safety guidelines and precautions to accomplish the work without injury to personnel or damage to any building components or contents.
- B. Coordinate system installation with the Electrical Contractor. Grounding of controller shall be equipment according to Division 26.
- C. Heat trace circuit startup shall occur at the ambient temperature of 40°F.
- D. The control panel shall be supervised by the fire alarm system for the following conditions:
 - 1. Ground fault
 - 2. Loss of power
 - 3. High and low temperature
 - 4. High and low current
 - 5. The supervisory conditions shall be monitored by the fire alarm panel via a form C dry alarm contact on the heat trace control panel. Activation of the contact to a closed position upon these conditions shall initiate a trouble signal at the fire alarm panel. Coordinate connection of the contact with the Fire Alarm Contractor.
- E. Install electric heating cable in accordance with the manufacturer's instructions.
- F. Install warning tape on piping insulation where piping is equipped with electric heating cables.

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3.4 IDENTIFICATION

- A. Warning Tape: Printed “Electrical Tracing” or warning as provided by the manufacturer; vinyl, with permanent, waterproof, self-adhesive back.
- B. Locate warning label outside of any jacketing at minimum 10-foot intervals along the entire length of electrically traced piping.

3.5 FIELD QUALITY CONTROL

- A. Perform the tests and inspections with the assistance of a factory-authorized service representative.
- B. Field Inspection and Testing
 - 1. The Contractor shall be completely responsible for coordinating the final inspection with the AHJ. As-built documentation shall be provided prior to this event.
 - 2. The system shall be commissioned in accordance to the Manufacturer’s Installation and Operation manual.
 - 3. The heating cable circuit integrity shall be tested using a Vdc megohmmeter at the following intervals below. Minimum acceptable insulation resistance should be greater than 10 megaohms.
 - a. Before installing the heating cable
 - b. After heating cable has been installed onto the pipe
 - c. After installing connection kits
 - d. After the thermal insulation is installed onto the pipe
 - e. Prior to initial start-up
 - f. All commissioning results will be recorded and presented to the owner.

END OF SECTION 210533

SECTION 21 07 19

FIRE SUPPRESSION PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This is a specification for the installation of freeze protection insulation for fire suppression piping.
- B. The Contractor is responsible for the design, furnishing and installation of the following:
 - 1. Design and installation of UL listed insulation materials required for protection of fire suppression pipe exposed to freezing conditions.

1.2 REFERENCES

- A. Refer to Section 21 00 00 for applicable codes, standards and guidelines.
- B. America Society for Testing and Materials (ASTM):
 - 1. ASTM C534/C534M, Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form, 2014
 - 2. ASTM E84-15a, Standard Test Method for Surface Burning Characteristics of Building Materials, 2015.
 - 3. ASTM E96/E96M. Standard Test Methods for Water Vapor Transmission of Materials, 2014
 - 4. ASTM C921, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation, 2010.
 - 5. ASTM B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate, 2014.
- C. Underwriters Laboratories (UL):
 - 1. UL 723, Standard for Test for Surface Burning Characteristics of Building Materials, latest edition.
- D. Code Conflicts:
 - 1. Any conflicts between the referenced codes and this specification shall be brought to the attention of the Architect and Contractor for interpretation.

1.3 DEFINITIONS

- A. Owner shall mean San Antonio Housing Authority (SAHA)
- B. Architect shall mean Raba Kistner, Inc. (RKCI)
- C. Fire Protection Engineer of Record or FPE shall mean Fire Protection Consulting Group, LLC (FPCG).

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- D. Contractor shall mean a licensed General Contractor awarded the project who is responsible for all Work required as part of this project.
- E. Sub-contractor or installing contractor shall mean a company specializing in piping insulation application with at least 5 years documented, relevant experience.
- F. NICET shall mean National Institute for Certification in Engineering Technologies.
- G. Authority Having Jurisdiction (AHJ): City of San Antonio Development Services (CoSA).
- H. Approved: Acceptable to the Authority Having Jurisdiction and FPE.
- I. Listed: Equipment or materials included in a list published by an organization that is acceptable to the AHJ, and concerned with evaluation of products that maintains periodic inspection of production of listed products whose listing states that either the equipment or material meets appropriate designated standards or has been tested and found suitable for a specified purpose.

1.4 SYSTEM DESCRIPTION

- A. The piping insulation system shall be a complete installation providing insulation, jacketing, and sealing compliant with the referenced standards and the manufacturer's instructions. Work shall be in accordance with the codes and standards and their annexes / appendices referenced in Paragraph 1.2 of this specification and as indicated.
- B. The Contractor shall provide design, labor, materials, and equipment for the following as indicated and described herein:
 - 1. A complete insulation and jacketing system for piping exposed indoors and outdoors to freezing conditions.
 - 2. A minimum of 1-inch of insulation shall be used.
 - 3. Heat transfer analysis calculations shall be performed and provided to determine insulation thickness in accordance with NFPA 13 and prepared by the manufacturer or certified representative.
 - 4. Refer to Division 01 for the procedural requirements for project record documents, operation and maintenance manuals, warranties and spare parts.
 - 5. Verification of all existing conditions pertinent to the scope of this work shall be required.

1.5 SUBMITTALS

- A. All submittals must be reviewed and approved by the Architect prior to submitting to the AHJ for a permit. Sub-contractor shall not commence installation work without explicit authorization by the Contractor.
 - 1. Submittals shall include the following documentation and shall comply with the project submittal requirements as specified in Division 01:
 - a. Equipment Books: A clearly annotated document that includes complete manufacturer's information on every component proposed to be utilized.
 - b. Shop Drawings and Hydraulic Calculations: Shop drawings shall be drawn in AutoCAD format to an indicated scale and plotted on sheets of uniform size with a plan of each floor and shall show items listed Chapter 23 of NFPA 13 Plans and Calculations that pertain to this system design.
 - c. Pipe Heat Loss Calculations: Perform calculations which demonstrate the following:
T_m – Maintain temperature of 40°F; T_a – Minimum expected ambient temperature

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of 5°F; Pipe material; Thermal insulation type and thickness. Calculate the temperature differential between pipe maintain and the minimum ambient temperature. Calculate the pipe heat loss, adjusted for the specific insulation type.

- d. Documents shall be submitted in PDF format to be reviewed by the FPE and returned and noted with the applicable status (Accepted/Rejected).
 2. The appropriate number of submittal copies shall be as specified in Division 01.
- B. Close Out Documentation
1. The Owner, Contractor, Architect and FPE shall each be provided with the following documents and all project record documents and manuals as specified in Division 01:
 - a. Operation and maintenance manuals. The data shall include a plain language description of the system and operating sequence, manufacturer's technical data, and data sheets for all installed equipment.

1.6 QUALITY ASSURANCE

- A. Qualifications
1. Work shall be performed by a company and personnel specializing in insulation application with not less than 5 years documented, relevant experience.
 2. Insulation shall only be applied when all surfaces are clean, dry, free of dirt, duct, grease, oil, frost, moisture or other elements.
 3. Labeling: Insulation labeled or stamped with brand name and number.
 4. Work shall be performed at the temperatures recommended by the manufacturer.
- B. Pre-Installation Conference
1. Prior to installation, the Contractor shall arrange a pre-installation conference with the Architect and Owner to identify potential installation issues and conflicts.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Acceptance at Site
1. Contractor shall inspect all material upon arrival at the site. Any defective or damaged material shall be immediately removed from site and replaced with properly operating and serviceable equipment.
- B. Storage and Protection
1. Contractor shall provide for secure storage on the site at a location approved by the Owner.
 2. Material shall be delivered is unbroken, factory furnished packaging and stored in a clean, dry indoor space which provides protection from the weather.

1.8 SCHEDULING AND SEQUENCING

- A. All sequencing and scheduling of installation and inspections be coordinated by the Contractor. Submit a schedule for completion of all work to the Owner for approval.

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1.9 WARRANTY

- A. All workmanship, materials, and equipment furnished under this contract shall be free from defects in workmanship and materials under normal use and service for a period, and under the terms, specified in Division 0 and 1.
- B. The equipment manufacturer shall be represented by a local service company, and the name shall be furnished to the Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. All equipment shall be UL listed and meet ASTM applicable standards. Basis of design product:
 - 1. Armacell.
 - 2. Substitutions must be formally submitted and approved prior to order and installation.

2.2 SYSTEM COMPONENTS

- A. Elastomeric Insulation
 - 1. Insulation material shall be a flexible, closed-cell elastomeric insulation in tubular or sheet form:
 - 2. AP Armaflex.
 - 3. Insulation materials shall have a closed-cell structure to prevent moisture from wicking.
 - 4. Materials shall have a flame spread index of less than 25 and a smoke-developed index of less than 50 when tested in accordance with ASTM E 84.
 - 5.
- B. Adhesives
 - 1. Adhesive shall be the insulation manufacturer's recommended contact adhesive: Armaflex 520,
 - 2. Armaflex 520 BLV or Armaflex HT 625 Adhesive.
 - 3. Accessories such as adhesives, mastics and cements shall have the same properties as listed above and shall not detract from any of the system ratings as specified above.
- C. PVC Jacket
 - 1. One piece molded type fitting covers and sheet material, off-white color.
 - 2. Minimum Service Temperature: 0 degrees F (-18 degrees C).
 - 3. Maximum Service Temperature: 150 degrees F (66 degrees C).
 - 4. Moisture Vapor Permeability: 0.002 per inch (0.0029 ng/Pa s m), maximum, when tested in accordance with ASTM E96/E96M.
 - 5. Thickness: 10 mil (0.25 mm).
 - 6. Connections: Brush on welding adhesive.
 - 7.
- D. Vapor Retardants
 - 1. Mastics: Use materials as recommended by the insulation material manufacturer that are compatible with insulation materials, jackets, and substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. The Contractor must field verify all conditions prior to installation. Any inquiries or discrepancies shall be addressed to the Architect.

3.2 PREPARATION

- A. Install materials after piping has been tested and approved.
- B. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 PIPING

- A. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; and free of voids throughout the length of ducts and fittings.
- B. Install pipe insulation by slitting tubular sections and applying onto piping or tubing. Alternately, whenever possible, slide unslit sections over the open ends of piping or tubing. All seams and butt joints shall be adhered and sealed using Armaflex 520 or 520 BLV Adhesive.
- C. Insulation shall be pushed onto the pipe, never pulled. Stretching of insulation may result in open seams and joints.
- D. All edges shall be clean cut. Rough or jagged edges of the insulation shall not be permitted. Proper tools such as sharp non-serrated knives must be used.
- E. On cold piping, insulation shall be adhered directly to the piping at the high end of the run using a two-inch strip of Armaflex 520 or 520 BLV Adhesive on the ID of the insulation and on the pipe. All exposed end cuts of the insulation shall be coated with Armaflex 520 or 520 BLV Adhesive. All penetrations through the insulation and termination points must be adhered to the substrate to prevent condensation migration.
- F. Sheet insulation shall be used on all pipes larger than 6" IPS. Insulation shall not be stretched around the pipe.
- G. Seams shall be staggered when applying multiple layers of insulation.
- H. Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften or otherwise attack insulation or jacket when in either wet or dry state.
- I. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- J. Apply insulation with tight longitudinal seams and end joints. Bond the seams and joints with adhesive recommended by the insulation material manufacturer.

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- K. Apply insulation with the least number of joints practical.
- L. Apply insulation over fittings, valves, and specialties, with continuous thermal and vapor-retardant integrity, unless otherwise indicated.

3.4 VALVES, FLANGES AND FITTINGS

- A. All fittings shall be insulated with the same insulation thickness as the adjacent piping. All seams and mitered joints shall be adhered with Armaflex 520 or 520 BLV Adhesive. Screwed fittings shall be sleeved and adhered with a minimum 1" overlap onto the adjacent insulation.
- B. Valves, flanges, strainers, and Victaulic couplings shall be insulated using Armaflex donuts that shall then be covered with sheet or oversized tubular insulation.
- C. All edges shall be clean-cut. Rough or jagged edges shall not be permitted.

3.5 HANGERS

- A. Standard and split hangers -- Piping supported by ring hangers shall have hangers insulated with the same insulation thickness as the adjacent pipe. All seams and butt joints shall be sealed with Armaflex 520 or 520 BLV Adhesive. Armaflex HT 625 Adhesive shall be used with HT Armaflex. Ring hangers may be sleeved using oversized tubular insulation. On cold piping, insulation shall extend up the hanger rod a distance equal to four times the insulation thickness. Insulation tape may be used to a thickness equal to the adjacent insulation thickness.

3.6 FIELD APPLIED JACKET

- A. Indoor, Exposed: PVC jacket shall be used. Apply in accordance with manufacturer's instructions.

3.7 INSTALLATION

- A. Practice and Procedures
 1. All applicable practices and procedures, as required per the referenced codes, standards, and the AHJ, shall be implemented to ensure the proper installation of a fully operational, compliant system.
 2. Comply with all appropriate safety guidelines and precautions to accomplish the work without injury to personnel or damage to any building components or contents.
- B. Coordinate materials and method of sealing new openings for pipe in partitions and floors.

3.8 IDENTIFICATION

- A. ASME stamps, UL labels, and similar stamps and labels shall not be covered.

3.9 FIELD QUALITY CONTROL

- A. Perform inspections for approval by the Contractor.

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3.10 Final Inspection and Testing

- A. The Contractor shall be completely responsible for coordinating the final inspection with the AHJ. As-built documentation shall be provided prior to this event.

END OF SECTION 210719

SECTION 21 13 13

WET-PIPE FIRE SPRINKLER SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. This is a specification for the installation of a complete wet-pipe automatic sprinkler system for the existing Villa Tranchese Apartments located at 307 Marshall Street in San Antonio, Texas.
- B. The Contractor is responsible for the design, furnishing and installation of the following:
 - 1. A single, wet-pipe alarm riser and system throughout the applicable areas of the Level 1.
 - 2. Wet-pipe sprinkler protection throughout Levels 2 through 18 utilizing a floor control valve assembly (FCVA) for each level.
 - 3. The sprinkler system per level shall be supplied from a new, automatic Class 1 standpipe system. Refer to standpipe Specification Section 21 12 00.
 - 4. Sprinkler protection for the Trash and Linen Chutes.
 - 5. San Antonio Water Systems (SAWS) supply to be augmented by a fire pump. Refer to fire pump Specification Section 21 31 13.
 - 6. Sprinkler system shall be hydraulically calculated in accordance with NFPA 13.
 - 7. Fire Service Elevator Hoistways and associated machine/controller room: Sprinkler protection is prohibited in these locations in accordance with the IBC 2015, Section 3007.2.1. Shunt trip of fire service elevators is not permitted.
 - 8. Fire caulk and patch penetrations of all rated assemblies as specified in Division 01 and 02.

1.2 REFERENCES

- A. National Fire Protection Association (NFPA):
 - 1. NFPA 13, Installation of Sprinkler Systems, 2013 edition.
 - 2. NFPA 14, Installation of Standpipe and Hose Systems, 2013 edition.
 - 3. NFPA 20. Installation of Stationary Pumps for Fire Protection, 2013 edition.
 - 4. NFPA 25, Inspection, Testing and Maintenance of Water- based Fire Protection Systems, 2015 edition
 - 5. NFPA 70, National Electrical Code, 2014 edition.
 - 6. NFPA 72, National Fire Alarm Code, 2013 edition.
- B. International Code Council (ICC):
 - 1. International Building Code (IBC), 2015 edition with City of San Antonio (CoSA) Amendments.
 - 2. International Fire Code (IFC), 2015 edition with CoSA Amendments
- C. State Licensing Regulations:
 - 1. Texas Insurance Code, Chapter 6003 (formerly Article 5.43-3), Fire Protection Sprinkler System Service and Installation & 28 TAC §§ 34.700 the Fire Sprinkler Rules, Summer 2016.

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- D. Equipment Listings:
 - 1. FM Global Fire Protection Approval Guide, 2015 edition, or
 - 2. Underwriters Laboratories (UL) Fire Protection Equipment Directory, 2015 edition, or
 - 3. Other Nationally Recognized Testing Laboratory (NRTL).
- E. Code Conflicts:
 - 1. Any conflicts between the referenced codes and this specification shall be brought to the attention of the Architect and Contractor for interpretation.

1.3 DEFINITIONS

- A. Owner shall mean San Antonio Housing Authority (SAHA)
- B. Architect shall mean Raba Kistner, Inc. (RKCI)
- C. Fire Protection Engineer of Record or FPE shall mean Fire Protection Consulting Group, LLC (FPCG).
- D. Contractor shall mean a licensed General Contractor awarded the project who is responsible for all Work required as part of this project.
- E. Sub-contractor or installing contractor shall mean a Fire Sprinkler Contractor licensed in the State of Texas to design, install, and test fire sprinkler systems.
- F. NICET shall mean National Institute for Certification in Engineering Technologies.
- G. Authority Having Jurisdiction (AHJ): City of San Antonio Fire Department.
- H. Approved: Acceptable to the Authority Having Jurisdiction and FPE.
- I. Listed: Equipment or materials included in a list published by an organization that is acceptable to the AHJ, and concerned with evaluation of products that maintains periodic inspection of production of listed products whose listing states that either the equipment or material meets appropriate designated standards or has been tested and found suitable for a specified purpose.

1.4 SYSTEM DESCRIPTION

- A. The automatic fire sprinkler systems shall be wet pipe, hydraulically calculated using appurtenances as described within this specification and shown on the construction drawings. Work shall be in accordance with the codes and standards and their annexes / appendices referenced in Paragraph 1.2 of this specification and as indicated.
- B. The Contractor shall provide design, labor, materials, and equipment for the following as indicated and described herein:
 - 1. NFPA 13 shall be the standard used to prescribe the occupancy hazard classifications and sprinkler design criteria required for this project. Reference the design criteria for hazard categories as indicated on the drawing.
 - 2. Sprinkler head spacing shall be symmetrical to building structure, light fixtures, diffusers, etc. All heads shall be placed center of tile where lay-in ceiling tiles are used.

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3. Current flow test information is provided on the construction documents. Should the test provided become older than one-year before submittal of shop drawings, the Contractor shall provide a new current test as the basis of design.
4. Hydraulic calculations shall include sprinkler heads and piping within the remote area and all piping back to the source of the flow test.
5. Hydrostatic pressure testing is required per NFPA 13, 10.10.2.2. Pressure loss shall be determined by a drop in gauge pressure or visual leakage, as per NFPA 13, 10.10.2.2.2.
6. Refer to Division 01 for procedural requirements for the submittal of shop drawings and product data for approval.
7. Refer to Division 01 for the procedural requirements for project record documents, operation and maintenance manuals, warranties and spare parts.
8. Verification of all existing conditions pertinent to the scope of this work shall be required.

1.5 SUBMITTALS

- A. All submittals must be reviewed and approved by the Architect prior to submitting to the AHJ for a permit. Sub-contractor shall not commence installation work without explicit authorization by the Contractor.
 1. Submittals shall include the following documentation and shall comply with the project submittal requirements as specified in Division 01:
 - a. Equipment Books: A clearly annotated document that includes complete manufacturer's information on every component proposed to be utilized.
 - b. Shop Drawings and Hydraulic Calculations: Shop drawings shall be drawn in AutoCAD format to an indicated scale and plotted on sheets of uniform size with a plan of each floor and shall show items listed Chapter 23 of NFPA 13 Plans and Calculations that pertain to this automatic sprinkler system design.
 - c. Hydraulic Calculations: Hydraulic calculations shall be prepared on form sheets that include a summary sheet, detailed worksheets, and a graph sheet in conformance with NFPA 13.
 - d. Documents shall be submitted in PDF format to be reviewed by the FPE and returned and noted with the applicable status (Accepted/Rejected).
 2. The appropriate number of submittal copies shall be as specified in Division 01.
- B. Close Out Documentation
 1. The Owner, Contractor, Architect and FPE shall each be provided with the following documents and all project record documents and manuals as specified in Division 01:
 - a. As-built drawings.
 - b. Electronic set of AutoCAD based drawings on Windows formatted CD-ROM. AutoCAD release 2013 format.
 - c. Operation and maintenance manuals. The data shall include a plain language description of the system and operating sequence, manufacturer's technical data, and data sheets for all installed equipment.
 - d. Original test certificates and approvals by the AHJ.

1.6 QUALITY ASSURANCE

- A. Qualifications
 1. Work shall be performed by an automatic fire sprinkler contractor holding a current Sprinkler Certificate of Registration (SCR) with the Texas Department of Insurance and the State Fire Marshal's Office.
 2. Design shall be performed by one of the following: a Fire Protection Engineer licensed in the State of Texas or a NICET Level III or IV Automatic Sprinkler Engineering Technician

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holding a current Responsible Managing Employee-General (RME-G) license with the Texas Department of Insurance.

3. Installer Qualifications: Installer's responsibilities include designing, fabricating, and installing sprinkler systems. The Installer shall have a minimum of 5 years' experience working on similar systems and shall have installed a minimum of three dry-pipe sprinkler systems of similar size.
4. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
5. Welding Certificates: Where welded pipe joining methods are utilized for fabrication of any component piping, welding certificates shall be provided for the employees responsible for the fabrication. Certificates shall provide adequate information to confirm compliance with the requirements of NPFA 13.

B. Pre-Installation Conference

1. Prior to installation, the Contractor shall arrange a pre-installation conference with the Architect and Owner to identify potential installation issues and conflicts.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Acceptance at Site

1. Contractor shall inspect all material upon arrival at the site. Any defective or damaged material shall be immediately removed from site and replaced with properly operating and serviceable equipment.

B. Storage and Protection

1. Contractor shall provide for secure storage on the site at a location approved by the Owner's Representative.

1.8 SCHEDULING AND SEQUENCING

- A. All sequencing and scheduling of installation, inspections, testing, and placing system in full operation shall be coordinated by the Contractor. Submit a schedule for completion of all work to the Owner for approval.

1.9 WARRANTY

- A. All workmanship, materials, and equipment furnished under this contract shall be free from defects in workmanship and materials under normal use and service for a period, and under the terms, specified in Division 0 and 1.
- B. The equipment manufacturer shall be represented by a local service company, and the name shall be furnished to the Owner.

1.10 MAINTENANCE

- A. The automatic sprinkler contractor shall include a maintenance contract for the term of one (1) year beginning from the date of final acceptance by the Architect.
- B. Contractor is to furnish extra materials as follows:

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1. Sprinklers: No less than six of each type of head used in the facility with all quantities complying with Section 6.2.9.5 of NFPA 13, depending on the number of heads installed in the project.
2. Stock of spare sprinklers shall be kept in a location that will never exceed 100°F. A list of all types of sprinkler heads installed in the building shall be included with the stock and shall include the number of each type to be stocked. The list shall also include all information required by Section 6.2.9.7 of NFPA 13.
3. One of each type of special sprinkler wrench required for each different type of sprinkler head.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. All equipment shall be UL listed or FM approved, unless noted otherwise. Manufacturers of equipment and products shall not be limited so long as they comply with all other requirements of this specification and are approved by the Architect prior to submittal for permit or installation.

2.2 SYSTEM COMPONENTS

- A. Alarm Valve
 1. Wet-pipe, UL 193, 175-psig working pressure, designed for vertical installation
 2. Cast-iron inlet and outlet, flanged or grooved
 3. Bronze grooved seat with O-ring seals, and single-hinge pin and latch design
 4. Trim sets for bypass, drain, and fill-line attachment with strainer.
 5. Drain assembly
 6. Alternative: Shotgun type riser alarm valve with trim, gauges and main drain assembly
- B. Floor Control Valve Assembly (FCVA)
 1. Standard, non-pressure regulating type:
 - a. Victaulic Model 747M or equivalent.
 - b. Butterfly control valve with integral tamper switch
 - c. Check valve
 - d. Waterflow switch
 - e. Alarm test and drain assembly with site glass
 - f. Pressure Gauge
 - g. Refer to construction drawing detail for further description.
 2. Pressure regulating type:
 - a. Victaulic Model 747MP or equivalent
 - b. Butterfly control valve with integral tamper switch
 - c. Cla-Val Model 90-21G or equivalent
 - d. Check valve
 - e. Waterflow switch
 - f. Alarm test and drain assembly with site glass
 - g. Pressure Gauge
 - h. Pressure relief valve
 - i. Refer to construction drawing detail for further description.
- C. Waterflow Switch
 1. System Sensor Model WFDN or equivalent
 2. UL listed

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3. Sealed against dust and contaminants
 4. Water resistant
 5. Field replaceable timer switch
 6. Visual and Audible activation
 7. Tamper resistant screws and cover
- D. Tamper Switches
1. Supervisory switches shall be furnished and installed under this contract. Switches shall have single-pole double-throw (SPDT), normally closed contacts. The entire assembly shall be tamper-proof and shall be contained in a weather-proof housing.
- E. Aboveground Pipe and Fittings
1. Pipe shall be ferrous as allowed by Section 6.3.1 of NFPA 13.
 2. Fittings shall be roll-grooved or threaded as listed by the manufacturer.
 3. Black steel piping shall be used for all portions of the system. Schedule 10 piping is permissible.
 4. Fitting and joining methods comply with applicable sections of Chapter 6.
 5. Socket fittings (*e.g.*, Victaulic FIT, *etc.*) are prohibited.
- F. Valves
1. All valves shall be listed for their intended purpose and shall comply with Section 6.7 of NFPA 13.
 2. Globe or gate valves 2-inch and smaller – Threaded or O.S.&Y., rising stem.
 3. Butterfly or ball valves 2½ inch and smaller – grooved or threaded, indicating-type.
 4. Indicating valves 2½-inch and larger – wafer, flanged or roll-grooved O.S.&Y. gate valve, rising stem or indicating type.
 5. Indicating type control valves and drain/test valves shall be 175-psi water, oil, or gas (WOG).
 6. Check valves shall be approved 175-psi WOG horizontal swing check, wafer check, or other approved type as allowed by referenced standards.
- G. Signage (Identification)
1. Valves shall be identified in accordance with Paragraph 6.7.4 in NFPA 13.
- H. Hangers
1. Shall be provided as described by NFPA 13, Chapter 9.
- I. Automatic Sprinkler Heads
1. Non-residential Light and Ordinary Hazard public and work areas: Quick response as permitted per NFPA 13. Standard or extended coverage, concealed type. Plate color to be approved by the Architect.
 2. Open to structure areas: Bronze, upright, standard or quick response, standard or extended coverage, as permitted by NFPA 13 and the UL Listing.
 3. Trash and Linen Chutes: Coordinate sprinkler type with the chute manufacturer.
 4. Balconies: Dry sidewall, recessed, chrome, quick response, standard coverage.
 5. Residential areas:
 - a. Reliable Model F1FR or equivalent. Quick response, recessed, standard coverage. Finish to be approved by the Architect.
 - b. Reliable Res Model 58 horizontal sidewall and pendent or equivalents. Quick response, extended coverage. Finish to be approved by the Architect.
 - c. Residential corridors: Reliable Model DH56, recessed. Finish to be approved by the Architect.
 6. Quick response sprinklers shall be used in all light-hazard areas. Sprinklers that utilize O-ring sealed plungers shall be prohibited.

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- J. Valve Supervisory Switches:
 - 1. Manufacturers: No limitation, where meeting the requirements of this specification.
 - 2. Standard: UL 346.
 - 3. Type: Electrically supervised.
 - 4. Components: Single-pole, double-throw switch with normally closed contacts.
 - 5. Design: Signals that controlled valve is in other than fully open position.

- K. Electrically Operated Alarm Bell:
 - 1. Manufacturers: No limitation, where meeting the requirements of this specification.
 - 2. Standard: UL 464.
 - 3. Type: Vibrating, metal alarm bell.
 - 4. Size: 10-inch (150-mm) minimum diameter.
 - 5. Finish: Red-enamel factory finish, suitable for outdoor use.

- L. Pressure Gauges
 - 1. Manufacturers: No limitation, where meeting the requirements of this specification.
 - 2. Standard: UL 393.
 - 3. Dial Size: 3-1/2- to 4-1/2-inch (90- to 115-mm) diameter.
 - 4. Pressure Gauge Range: 0 to 300 psig.
 - 5. Water System Piping Gauge: Include "WATER" or "AIR/WATER" label on dial face.
 - 6. Air System Piping Gauge: Include "AIR" or "AIR/WATER" label on dial face.

- M. Fire Department Connection (FDC):
 - 1. Dual body, flush wall mount type:
 - a. Compliant with San Antonio Fire Department (SAFD) standards.
 - b. Material: Ductile iron
 - c. Inlets: Four 2 1/2" inlets with individual drop clappers
 - d. Outlet: 6"
 - e. Caps: Lockable cap
 - f. Polished brass snoots
 - g. Escutcheon Plate: Polished brass
 - h. Escutcheon Plate Marking: "Auto Sprinkler and Standpipe"

PART 3 - EXECUTION

3.1 EXAMINATION

- A. The Contractor must field verify all conditions prior to installation. Any inquiries or discrepancies shall be addressed to the Architect.

3.2 PREPARATION

- A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.
- B. Report test results promptly and in writing.

3.3 PIPING INSTALLATION

- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
 - 1. Deviations from approved shop drawings for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from any approved submittals.
- B. Piping Standard: Comply with requirements in NFPA 13 for installation of sprinkler piping.
- C. Seismic restraint on piping is not required.
- D. Flanges, flange adapters, or couplings for grooved-end piping for valves, apparatus, and equipment shall be permitted as prescribed per NFPA 13.
- E. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.
- F. Install sprinkler piping with drains for complete system drainage.
- G. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements in NFPA 13 for hanger materials.
- H. Test and drain risers shall be as required per NFPA 13 and NFPA 14. Refer to construction drawings for further details on test and drain riser assemblies.
- I. Install steel sleeves and fire caulking for piping penetrations of walls, ceilings, and floors.
- J. Install sleeve seals and fire caulking for piping penetrations of concrete walls and slabs.
- K. Install escutcheons for piping penetrations of walls, ceilings, and floors in public areas.

3.4 INSTALLATION

- A. Practice and Procedures
 - 1. All applicable practices and procedures, as required per the referenced codes, standards, and the AHJ, shall be implemented to ensure the proper installation of a fully operational, compliant system.
 - 2. Comply with all appropriate safety guidelines and precautions to accomplish the work without injury to personnel or damage to any building components or contents.
 - 3. Field welding is prohibited for the installation of this system.
- B. Wall or floor penetrations shall be neatly patched. Coordinate materials and method of sealing new openings for pipe in partitions and floors.
- C. Penetrations through fire rated walls shall be sealed with approved fire resistive materials and/or assemblies. Material and assemblies shall be suitable for the hourly rating of the penetrated construction element.
- D. All piping shall be free of rust and debris inside and out.

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- E. All exposed piping shall be painted red in mechanical rooms, storage rooms, or similar space or shall be painted to match the surroundings in architecturally sensitive areas.

3.5 IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.
- B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26.

3.6 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 3. Test and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
 4. Energize circuits to electrical equipment and devices.
 5. Coordinate with fire-alarm tests. Operate as required.
 6. Coordinate with fire-pump tests. Operate as required.
- C. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports and submit for review by the FPE.

3.7 CLEANING

- A. Clean dirt and debris from sprinklers.
- B. Remove and replace sprinklers with paint other than factory finish.

3.8 Final Inspection and Testing

- A. The Contractor shall be completely responsible for coordinating the final inspection and testing with the AHJ. As-built drawings shall be provided prior to this event.

END OF SECTION 211310

SECTION 21 31 13

CENTRIFUGAL FIRE PUMP

PART 1 - GENERAL

1.1 SUMMARY

- A. This specification is for the installation of a new complete electric motor driven fire pump and appurtenances to serve the existing Villa Tranchese Apartments located at 307 Marshall Street in San Antonio, Texas.
- B. The Contractor shall provide design, labor, materials, and equipment for the following as indicated and described herein:
 - 1. Provide a new electric motor driven, horizontal split case, automatic fire pump rated at 1000 gpm at 150 psi, complete with by-pass, test loop, test header, combination fire pump controller/automatic transfer switch and appurtenances indicated and described herein.
 - 2. Provide and install a new electric motor driven pressure maintenance pump (jockey pump) rated at 8 gpm at 160 psi, complete with controller and appurtenances.
 - 3. Provide new fire pump test header with four 2½-inch hose valves as indicated and described herein.
 - 4. Two new fire department connections shall be provided under Specification Section 21 13 10.
 - 5. Provide a UL listed and FM approved double check backflow prevention assembly installed in the pump room as indicated. The valve shall be installed vertically and listed for vertical installation and service.
 - 6. Provide a new pressure reducing valve in the pump supply to the sprinkler system floor control valves as indicated on the design drawings.
 - 7. Provide a flow meter test loop as indicated.
 - 8. Refer to associated work under Specification Section 21 13 10 – Wet-Pipe Fire Sprinkler System.
 - 9. Refer to Division 01 for procedural requirements for the submittal of shop drawings and product data for approval.
 - 10. Refer to Division 01 for the procedural requirements for project record documents, operation and maintenance manuals, warranties and spare parts.
 - 11. Verification of all existing conditions pertinent to the scope of this work shall be required.

1.2 REFERENCES

- A. National Fire Protection Association (NFPA):
 - 1. NFPA 13, Installation of Sprinkler Systems, 2013 edition.
 - 2. NFPA 14, Installation of Standpipe and Hose Systems, 2013 edition.
 - 3. NFPA 24, Installation of Private Fire Service Mains and Their Appurtenances, 2013 edition.
 - 4. NFPA 25, Inspection, Testing and Maintenance of Water-based Fire Protection Systems, 2015 edition.
 - 5. NFPA 20, Installation of Stationary Pumps for Fire Protection, 2013 edition.
 - 6. NFPA 70, National Electrical Code, 2014 edition.
 - 7. NFPA 72, National Fire Alarm Code, 2013 edition.

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- B. International Code Council (ICC):
 - 1. International Building Code (IBC), 2015 edition with City of San Antonio (CoSA) Amendments.
 - 2. International Fire Code (IFC), 2015 edition with CoSA Amendments.
- C. State Licensing Regulations:
 - 1. Texas Insurance Code, Chapter 6003, Fire Protection Sprinkler System Service and Installation and the Fire Sprinkler Rules, Summer 2016.
- D. Equipment Listings:
 - 1. FM Global Fire Protection Approval Guide, 2015 edition, or
 - 2. Underwriters Laboratories (UL) Fire Protection Equipment Directory, 2015 edition, or
 - 3. Other Nationally Recognized Testing Laboratory (NRTL).
- E. Code Conflicts:
 - 1. Any conflicts between the referenced codes and this specification shall be brought to the attention of the Architect and Contractor for interpretation.

1.3 DEFINITIONS

- A. Owner shall mean San Antonio Housing Authority (SAHA)
- B. Architect shall mean Raba Kistner, Inc. (RKCI)
- C. Fire Protection Engineer of Record or FPE shall mean Fire Protection Consulting Group, LLC (FPCG).
- D. Contractor shall mean a licensed General Contractor awarded the project who is responsible for all Work required as part of this project.
- E. Sub-contractor or installing contractor shall mean a Fire Sprinkler Contractor licensed in the State of Texas to design, install, and test fire sprinkler systems.
- F. NICET shall mean National Institute for Certification in Engineering Technologies.
- G. Authority Having Jurisdiction (AHJ): City of San Antonio Development Services (CoSA).
- H. Approved: Acceptable to the Authority Having Jurisdiction and FPE.
- I. Listed: Equipment or materials included in a list published by an organization that is acceptable to the AHJ, and concerned with evaluation of products that maintains periodic inspection of production of listed products whose listing states that either the equipment or material meets appropriate designated standards or has been tested and found suitable for a specified purpose.

1.4 SUBMITTALS

- A. All submittals must be reviewed and approved by the Architect prior to submitting to City of San Antonio for a permit. Installation work without explicit authorization by the Contractor.
 - 1. Submittals shall include the following documentation and shall comply with the project submittal requirements as specified in Division 01:

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- a. Equipment Books: A clearly annotated document that includes complete manufacturer's information on every component proposed to be utilized.
 - b. Shop Drawings: Shop drawings shall be drawn in AutoCAD format to an indicated scale and plotted on sheets of uniform size and shall show items listed in NFPA 13 Chapter 23 for Working Plans (Section 23.1) and Water Supply Information (Section 22.2) that pertain to fire protection system design.
 - c. Hydraulic Calculations: Hydraulic calculations shall be prepared on form sheets that include a summary sheet, detailed worksheets, and a graph sheet in conformance with NFPA 13 Chapter 22 for Hydraulic Calculations (Section 23.3).
 - d. Documents shall be submitted in PDF format to be reviewed by the FPE and returned and noted with the applicable status (Accepted/Rejected).
2. The appropriate number of submittal copies shall be as specified in Division 01.

B. CLOSE OUT DOCUMENTATION

1. The Architect and Contractor shall each be provided with the following project record documents and manuals as specified in Division 01:
 - a. As-built drawings.
 - b. Electronic set of AutoCAD based drawings on Windows formatted CD-ROM. AutoCAD release 2013 format.
 - c. Operation and maintenance manuals. The data shall include a plain language description of the system and operating sequence, manufacturer's technical data, and data sheets for all installed equipment.
 - d. Original test certificates and approvals by the AHJ.

1.5 QUALITY ASSURANCE

A. QUALIFICATIONS

1. Work shall be performed by an automatic fire sprinkler contractor holding a current Sprinkler Certificate of Registration (SCR) with the Texas Department of Insurance and the State Fire Marshal's Office.
2. Design shall be performed by one of the following: a Fire Protection Engineer licensed in the State of Texas or a NICET Level III or IV Automatic Sprinkler Engineering Technician holding a current Responsible Managing Employee-General (RME-G) license with the Texas Department of Insurance.
3. Installer Qualifications: Installer's responsibilities include designing, fabricating, and installing sprinkler systems. The Installer shall have a minimum of 5 years' experience working on similar systems and shall have installed a minimum of three dry-pipe sprinkler systems of similar size.
4. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Coordinate material delivery, acceptance and storage with the Contractor. Refer to Division 01 for procedural requirements.

1.7 SCHEDULING AND SEQUENCING

- A. All sequencing and scheduling of installation, inspections, testing, and placing system in full operation shall be coordinated by the Contractor. Submit a schedule for completion of all work to the Owner for approval.

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1.8 WARRANTY

- A. Refer to Division 01 for requirements regarding warranty of workmanship, materials, and equipment provided under this contract.

1.9 MAINTENANCE

- A. The automatic sprinkler contractor shall include a maintenance contract for the term of one (1) year beginning from the date of final acceptance by the Architect.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. All equipment shall be UL listed and FM approved. Manufacturers of equipment and products shall not be limited so long as they comply with all other requirements of this specification and are approved by the Architect prior to submittal for permit or installation. Pre-approved manufacturers include the following:
 - 1. Fire pump and jockey pump:
 - a. Aurora-Pentair
 - b. Armstrong
 - c. Peerless
 - 2. Double check valve assembly
 - a. Ames
 - b. Watts
 - c. Wilkins
 - 3. Controllers and Automatic transfer switch
 - a. Firetrol
 - b. Metron

2.2 SYSTEM COMPONENTS

- A. Fire Pump, Jockey Pump, Controllers
 - 1. Fire Pump
 - a. Provide a complete operational electric motor driven automatic centrifugal horizontal split-case end-suction fire pump.
 - b. Pump shall be rated at 1000 gpm at 150 psig.
 - c. This pump shall deliver not less than 150% rated flow at not less than 65% rated pressure.
 - d. Pump shall be automatic start and manual stop.
 - e. This pump shall be hydrostatically tested prior to shipment. The hydrostatic test shall be at a pressure of not less than one and one-half times the no-flow head of this pump's maximum diameter impeller plus the maximum allowable suction head, but in no case less than 250 psig.
 - f. All piping, valves and appurtenances shall be as required by NFPA 13, NFPA 20, and the manufacturer.
 - 2. Fire Pump Electric Motor

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- a. Electric motor shall be UL listed and FM approved for service in fire protection systems.
- b. Provide and install a fully operational electric motor rated for **460 volts**, 60 hertz, 3-phase electrical service.
- c. Motor shall be of open drip proof design with a 1.15 service factor and shall comply with NFPA 70 and NFPA 20.
3. Fire Pump Controller/Power Transfer Switch
 - a. Provide and install a complete operational combination (integrated) automatic controller and power transfer switch.
 - b. Controller shall be automatic start and manual stop.
 - c. Soft start / soft stop required.
 - d. Both controller and transfer switch compartments shall include an isolating switch and circuit breaker.
 - e. Controller shall be complete with ½-inch test drain solenoids and automatic weekly test timers for performance of routine maintenance.
 - f. Withstand (Short Circuit) rating of 100,000 amps at 200-480 Volts.
 - g. The power transfer switch, with appurtenances, shall be integral with the controller and matched for service with the fire pump controller. The power transfer switch shall be suitable to the emergency power service. The emergency power source is a generator set that qualifies as a generator set power source. The transfer switch shall be:
 - 1) Stand alone, NEMA Type 2, drip proof enclosure.
 - 2) Factory assembled, wired and tested as a single unit.
 - 3) Shall include means to visibly indicate transfer switch position (i.e. in individually indicate both normal and emergency power positions).
4. Pressure Maintenance Pump
 - a. Pressure maintenance pump shall be electric motor driven, in-line vertical shaft, centrifugal type. An approved indicating gate valve of the outside screw and yoke (O.S.&Y.) type shall be provided in the maintenance pump discharge and suction piping. Oil-filled water pressure gauge and approved check valve in the maintenance pump discharge piping shall be provided. Check valve shall be swing type with removable inspection plate.
 - b. The pressure maintenance pump shall meet the following criteria:
 - 1) Rated discharge of 8 gpm at 160 psig
 - 2) Rated 3 horsepower minimum
 - 3) 3-phase, 60 hertz, **480 Volt electric service**
5. Pressure Maintenance Pump Controller
 - a. Pressure maintenance pump controller shall be arranged for automatic and manual starting and stopping and be equipped with a “manual-off-automatic” switch. The controller shall be complete prewired, ready for field connections, and wall-mounted in a NEMA Type 2 drip-proof enclosure. The controller shall be equipped with a bourdon tube pressure switch or a solid state pressure switch with independent high and low adjustments for automatic starting and stopping.
6. Pump Base Plate and Pad
 - a. The fire pump and jockey pump shall each be provided with a new reinforced concrete pump pad that is integral with the reinforced concrete floor to which the base plate for each pump shall be mounted.
7. Test Header Manifold
 - a. The test header manifold shall consist of a minimum of four 2½- inch hose valves supplied by a minimum 6-in. supply line. Header shall be located such that operation without hose will not adversely affect the site due to erosion or other damage.
 - b. Fire hose valve:
 - 1) Potter-Roemer Model 5863 or equivalent.
 - 2) 2½” NPT female inlet x 2½” NST male outlet.

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- 3) Globe type valves.
 - 4) Polished brass.
 - 5) Plastic caps with connectors.
 - 6) Polished brass plate lettered "Pump Test Connection".
8. Flow meter
- a. A flow test loop shall be installed. Victaulic Model 735 Fire Pump Test Meter or equivalent. Install per manufacturer's instructions. Provide butterfly control valves up and downstream from the meter.
- B. Backflow Prevention Assembly
1. Double Check Valve Assembly
 2. UL Listed or FM Approved
 3. University of Southern California approved (required)
 4. 100% lead free through the waterway
 5. Two independently operated spring loaded cam-check valves
 6. Required test cocks and optional inlet and outlet
 7. O.S.&Y resilient seated shutoff gate valves
 8. Ames 2000SS or approved equivalent.
- C. Pressure Reducing Valve
1. Cla-Val Model 90-21 or equivalent.
 2. Globe type.
 3. Ductile iron.
 4. Epoxy coated.
 5. UL listed for maximum flow capacity.
- D. Flange Spigot (If not provided by others)
1. Stainless steel tubing.
- E. Fire Department Connection
1. Refer to Section 21 13 10 for provision of the fire department connection (FDC) as specified.
- F. Systems Riser Manifold
1. A minimum 6-inch system piping shall supply the standpipe system. The manifold for the 1st Floor automatic sprinkler systems shall be determined through hydraulic calculation.
- G. Tamper Switches
1. Supervisory switches shall be furnished and installed under this contract. Switches shall have single-pole double-throw (SPDT), normally closed contacts. The entire assembly shall be tamper-proof and shall be contained in a weather-proof housing.
- H. Aboveground Pipe and Fittings
1. Pipe shall be ferrous as allowed by Section 6.3.1 of NFPA 13.
 2. Fittings shall be roll-grooved or threaded as listed by the manufacturer.
 3. Black steel piping shall be used for all portions of the system. Schedule 10 piping is permissible where diameters and joining methods comply with Sections 6.3 and 6.5 of NFPA 13.
 4. Socket fittings (*e.g.*, Victaulic FIT, *etc.*) are prohibited.
 5. Chrome split plates shall be installed at all pipe penetrations through the interior walls. Cast iron galvanized plates shall be installed for exterior wall penetrations.
- I. Valves

SAN ANTONIO HOUSING AUTHORITY

Villa Tranchese Apartments:

PHASE B – Fire Protection & Life Safety Renovations

RKCI Project No: ASR17-019-00

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1. All valves shall be listed for their intended purpose and shall comply with Section 6.7 of NFPA 13.
 2. Globe or gate valves 2-inch and smaller – Threaded or O.S.&Y., rising stem.
 3. Butterfly or ball valves 2½ inch and smaller – grooved or threaded, indicating-type.
 4. Indicating valves 2½-inch and larger – wafer, flanged or roll-grooved O.S.&Y. gate valve, rising stem or indicating type.
 5. Indicating type control valves and drain/test valves shall be 175-psi water, oil, or gas (WOG).
 6. Check valves shall be approved 175-psi WOG horizontal swing check, wafer check, or other approved type as allowed by referenced standards.
- J. Signage (Identification)
1. Valves shall be identified in accordance with Paragraph 6.7.4 in NFPA 13.
 2. The signs shall be located in accordance with NFPA 13 Section 24.5 and shall include information as listed therein and as required in NFPA 14 Section 6.8 and as indicated.
 3. Directional flow arrows shall be provided on main piping within the fire pump room.
- K. Hangers
1. Shall be provided as described by NFPA 13, Chapter 9.
- L. Pipe Stands
1. Pipe saddle fastened securely to a minimum 2-inch diameter pipe stand.
 2. Minimum 2" x 6" companion flange footing shall be securely bolted to the concrete floor.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. The Contractor must field verify all conditions prior to installation. Any inquiries or discrepancies shall be addressed to the Architect.

3.2 INSTALLATION

A. PRACTICE AND PROCEDURES

1. All applicable practices and procedures, as required per the referenced codes, standards, and the AHJ, shall be implemented to ensure the proper installation of a fully operational, compliant system.
2. Comply with all appropriate safety guidelines and precautions to accomplish the work without injury to personnel or damage to any building components or contents.
3. Field welding is prohibited for the installation of this system.

3.3 PAINTING AND PATCHING

- A. Wall or floor penetrations shall be neatly patched. Coordinate materials and method of sealing new openings for pipe in partitions and floors.
- B. Penetrations through fire rated walls shall be sealed with approved fire resistive materials and/or assemblies. Material and assemblies shall be suitable for the hourly rating of the penetrated construction element.

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- C. All piping shall be free of rust and debris inside and out.
- D. All exposed piping shall be painted red in mechanical rooms' storage rooms, or similar space or shall be painted to match the surroundings in architecturally sensitive areas.

3.4 SYSTEM ACCEPTANCE

- A. Final Inspection and Testing
 - 1. The Contractor shall be completely responsible for coordinating the final inspection and testing with the AHJ. As-built drawings shall be provided prior to this event.

3.5 SERVICE-ENTRANCE PIPING

- A. If provided by the sprinkler contractor, underground pipe and component installation shall comply with NFPA 13 and NFPA 24.
- B. Flushing of underground pipe and components is mandatory prior to connection to aboveground piping.
- C. Connect sprinkler piping to water-service piping for service entrance to building.
 - 1.

END OF SECTION 213113

SECTION 230100

SPECIAL CONDITIONS FOR ALL MECHANICAL WORK

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. This section covers the general provisions of the mechanical specifications applicable to the following systems:
 - 1. Heating, air conditioning, and ventilation.
- B. The use of the word mechanical in the body of the various specifications sections shall be interpreted to include all the aspects of all of the systems referenced in Mechanical Specifications.

1.2 DRAWINGS

- A. These specifications are accompanied by drawings of the building and details of the installations showing the locations of equipment, piping, ductwork, etc. The drawings and these specifications are complementary to each other; requirements described in one or the other shall be considered binding as if described in both.
- B. If any departures from the drawings are deemed necessary by the Contractor, details of such departures and the reasons therefore shall be submitted to the Owner's Representative for approval. No departures shall be made without prior written approval by the Owner's Representative.
- C. There are intricacies of construction which are impractical to specify or indicate in detail; means and methods for performing such work shall adhere to commonly accepted industry standards.
- D. It is the Contractor's responsibility to properly use all information found on the Architectural, Structural, Mechanical, and Electrical drawings and applicable shop drawings where such information affects his work.
- E. For new buildings, all final dimensions shall be scaled from the Architectural drawings, unless otherwise noted. For work associated with existing buildings (renovations and additions), all final dimensions shall be field verified.

1.3 CONSTRUCTION REQUIREMENTS

- A. The architectural, civil, structural, electrical, plumbing, fire protection and mechanical drawings, and specifications are all part of the Contract Documents. In many instances there are details described on another trade's drawings that are not necessarily included or referenced in the mechanical drawings. It is the Contractor's responsibility to review in detail all parts of the Contract Documents prior to submitting a bid. Failure to comply with this requirement shall not relieve the Contractor of responsibility or be used as cause for additional compensation because architectural, structural, or electrical details were not included in the mechanical drawings.

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- B. It is the intent of the Contract Documents to provide complete and fully functional installation in every respect. Material and/or construction details not specifically described in the Contract Documents, but commonly considered incidental to the industry, are required by the Contractor.
- C. The Contractor shall be responsible for fitting his material and apparatus into the building and shall carefully lay out his work at the site to conform to the structural conditions, to avoid all obstructions, to comply with Codes, to facilitate the work of other trades, to conform to the details of the installation supplied by the manufacturer of the equipment to be installed, and thereby to provide an integrated satisfactory operating installation.
- D. The mechanical, electrical and plumbing drawings are schematic in nature and do not show every connection in detail or every pipe or conduit in its exact location. These details are subject to the requirements of ordinances and structural and architectural conditions.
- E. The Contractor shall carefully investigate structural and finish conditions and shall coordinate the separate trades in order to avoid interference between the various phases of work. Work shall be laid out so that it will be concealed in furred chases and above suspended ceilings, etc. in finished portions of the building, unless specifically noted to be exposed. Work shall be installed to avoid compromising structural members; therefore, inserts to accommodate hangers shall be set before concrete is poured, and proper openings through floor, walls, beams, etc. shall be provided as hereinafter specified or as otherwise indicated or required. All work shall be installed parallel or perpendicular to building lines unless otherwise noted.
- F. When the mechanical drawings do not give exact details as to the elevation of pipe or ducts, physically arrange the systems to fit in the space available at the elevations intended with the proper grades for the functioning of the system involved. Piping, exposed conduit, and duct systems are generally intended to be installed true and square to the building construction, and located as high as possible against the structure in a neat and workmanlike manner. The plans do not show all required offsets, control lines, pilot lines, and other location details. Work shall be concealed in all finished areas. Piping specified to be insulated shall be supported in a manner that will allow the insulation to be installed without gaps. Insulated piping in concealed areas shall be offset with fittings as necessary to permit installation of insulation. Bending of pipes or installing pipes in a strain to insulate will not be permitted.
- G. Final placement of serviceable equipment shall be carefully coordinated with all other trades to ensure sufficient clearance for maintenance according to manufacturer's recommendations. Lubricating orifices and adjustable components shall be easily accessible. Piping, conduit, valve stems, cabling and other building systems shall not interfere with service space.
- H. Location of Exposed Devices
 - 1. All exposed devices (grills, registers, diffusers, sprinkler heads, medical gas outlets, plumbing rough-ins, lights, outlets, communication devices, etcetera) shall be referenced to fixed data points that are coordinated with all trades; shall be located to present symmetrical arrangements with respect to the fixed data point; and shall facilitate the proper arrangements of acoustical ceiling tiles. Fixed data points shall include such features as wall and ceiling lines, soffits, balanced border widths, masonry joints, etc. Devices located in acoustical ceiling tiles shall occur symmetrically in tile joints or in the centers of whole tiles. The final determination of the exact location of each outlet and the arrangements to be followed shall be acceptable to the Owner's Representative.
 - 2. The drawings schematically indicate locations of the exposed devices. Final locations shall be determined by carefully coordinating the drawings pertaining to each trade. Where conflicts are identified, Owner's Representative shall determine final location. The Owner reserves the right to make any reasonable change in location of any device before installation, without additional cost.

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- I. Mechanical Upgrades. Contractor shall track all mechanical upgrades separately as they are part of an Energy Performance Contract. This will include any Demolition, new Air Handlers, ductwork, controls, condensing units and all associated equipment to include electrical, housekeeping pads, etc.

1.4 QUALIFICATIONS

- A. Contractor must have minimum of five years experience installing commercial heating, ventilation and air conditioning systems, plumbing and piping systems similar to those described in these Contract Documents.
- B. Contractor must be licensed and hold a current contracting license that has been valid for a minimum of five years in the State of Texas.
- C. Contractor must be able to bond work for payment and performance of work being bid. Contractor's bonding agency shall have a Best's insurance rating of A or A+.

1.5 MATERIAL AND EQUIPMENT REQUIREMENTS

- A. Manufacturer's Instructions: The manufacturer's published instructions shall be followed for preparing, assembling, installing, erecting, and cleaning manufacturer materials or equipment, unless otherwise indicated. The Contractor shall promptly notify the Owner's Representative in writing of any conflict between the requirements of the Contract Documents and the manufacturer's direction and shall obtain the clarification of the Owner's Representative before proceeding with the work. Should the Contractor perform any such work that does not comply with the manufacturer's directions or such clarification by the Owner's Representative, he shall bear all costs arising in connection with the correction of the deficiencies.
- B. Storage at Site: The Contractor shall not receive material or equipment at the jobsite until there is suitable space provided to properly protect equipment from rust, drip, humidity, and dust damage and from surrounding work.
- C. Capacities shall be not less than those indicated and shall be such that no component or system becomes inoperative or is damaged because of startup or other overload conditions.
- D. Conformance to Agency Requirements: Where materials or equipment are specified to be approved, listed, tested, or labeled by the Underwriters Laboratories, Inc., ETL listed or constructed and/or tested in accordance with the standards of the American Society of Mechanical Engineers or the Air Moving and Conditioning Association, the Contractor shall submit proof that the items furnished under this section of the specifications conform to such requirements. The label of the Underwriters Laboratories, Inc. or ETL applied to the item will be acceptable as sufficient evidence that the items conform to such requirements. The ASME stamp or the AMCA label will be acceptable as sufficient evidence that the items conform to the respective requirements.
- E. Nameplates: Each major component of equipment shall have the manufacturer's name, address, and model-identification number on a plate securely attached to the item of equipment. All data on nameplates shall be legible at the time of Final Inspection.

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- F. Prevention of Rust: Standard factory finish will be acceptable on equipment specified by model number otherwise surfaces of ferrous metal shall be given a rust-inhibiting coating. The treatment shall withstand 200 hours in salt-spray fog test, in accordance with Method 6061 of Federal Standard No. 141. Immediately after completion of the test, the specimen shall show no signs of wrinkling or cracking and no signs of rust creepage beyond 1/8 inch on either side of the scratch mark. Where rust inhibitor coating is specified hereinafter, any treatment that will pass the above test is acceptable unless a specific coating is specified, except that coal tar or asphalt-type coatings will not be acceptable unless so stated for a specific item. Where steel is specified to be hot-dip galvanized, mill-galvanized sheet steel may be used provided all raw edges are painted with a zinc-pigmented paint conforming to Military Specification MIL-P-26915.
- G. Protection from Moving Parts: Belts, pulleys, chains, gears, couplings, projecting setscrews, keys, and other rotating parts located so that any person can come in close proximity thereto, shall be fully enclosed or properly guarded.
- H. Drive Guards: For machinery and equipment, provide guards as shown in AMCA 410 for belts, chains, couplings, pulleys, sheaves, shafts, gears, and other moving parts regardless of height above the floor. Drive guards may be excluded where motors and drives are inside factory-fabricated air handling units casings. Guards shall be constructed of sheet steel, cast iron, expanded metal, or wire mesh rigidly secured so as to be removable without disassembling pipe duct or electrical connection to equipment. Provide a 1-inch diameter hole in each drive guard at each shaft center to allow access for speed measurement.
- I. Verifications of Dimensions: The Contractor shall be responsible for the coordination and proper relation of his work to the building structure and to the work of all trades. The Contractor shall visit the premises and thoroughly familiarize himself with all details of the work and working conditions, to verify all dimensions in the field, and to advise the Owner's Representative of any discrepancy before performing any work. Adjustments to the work required in order to facilitate a coordinated installation shall be made at no additional cost to the Owner, Architect, or Engineer.
- J. Standard Products: Materials and equipment to be provided shall be the standard catalog products of manufacturers regularly engaged in the manufacture of products conforming to these specifications, and shall essentially duplicate materials and equipment that have been in satisfactory use at least two years.
- K. Spare Parts Data: As soon as practicable after approval of materials and equipment and, if possible, not later than four months prior to the date of beneficial occupancy, the Contractor shall furnish spare parts data for each different item of equipment listed. The data shall include a complete list of parts and supplies with current unit prices and sources of supply, a list of parts and supplies that are either normally furnished at no extra cost with the purchase of the equipment or specified hereinafter to be furnished as part of the Contract, and a list of additional items recommended by the manufacturer to assure efficient operation for a period of 120 days at the particular installation. The foregoing shall not relieve the Contractor of any responsibilities under the warranty specified.

1.6 INSPECTION OF THE SITE

- A. The Contractor shall visit the site, verifying all existing items indicated on drawings and/or specified, and familiarize himself with the existing work conditions, hazards, grades, actual formations, soil conditions, structures, utilities, equipment, systems, facilities, and local requirements. The submission of bids shall be deemed evidence of such visits. All proposals shall take these existing conditions into consideration, and the lack of specific information shall not relieve the Contractor of any responsibility.

1.7 UTILITY LOCATIONS AND ELEVATIONS

- A. Locations and elevations of the various utilities included within the scope of this work have been obtained from substantially reliable sources and are offered separately from the Contract Documents, as a general guide only, without guarantee as to accuracy. Examine the site, the locations, and availability of all utilities and services required for their relation to the work. Verify the location of all existing site utilities with each responsible utility company or applicable party. The Contractor shall repair all damage to existing utilities, whether indicated on the drawings or not, at his sole expense.

1.8 PERMITS, UTILITY CONNECTIONS, AND INSPECTIONS

- A. Permitting Fees: Contractor shall pay for all fees associated with permits required by municipal authorities having jurisdiction.
- B. Tapping and Impact Fees: Contractor shall pay for all fees associated with tapping into municipal utility mains, including sanitary sewer, natural gas and domestic water. Impact fees will be paid for by the Owner.
- C. Compliance: The Contractor shall comply in every respect with all requirements of local authorities having jurisdiction, including building inspections, fire marshal, local ordinances and codes, and utility company requirements. In no case does this relieve the Contractor of the responsibility of complying with these specifications and drawings where specified conditions are of a higher quality than the requirements of the above-specified authorities. Where requirements of the specifications and drawings are below the requirements of the above offices having jurisdiction, the Contractor shall make installations in compliance with the requirements of the above authorities.
- D. Utilities: The Contractor shall coordinate with the various utility companies involved in this project and shall provide required utility relocations, extensions, modifications, and/or changes (complete in all respects) as described in the Contract Documents. Contractor shall verify the location of all existing utilities with the applicable Utility Company. The Contractor shall be responsible for all damages to existing utilities, whether indicated on drawings or not, and repair all damage to existing utilities as acceptable to the affected Utility Company.
- E. Certification: Prior to final acceptance, the Contractor shall furnish a certificate of acceptance from the inspection departments having jurisdiction over the work for any and all work installed under this Contract. Any additional labor costs incurred as a result of a substitution shall be the Contractor's responsibility.

1.9 EXISTING FACILITIES

- A. The Contractor shall be responsible for loss or damage to the existing facilities caused by him and his workmen, and shall be responsible for repairing or replacing such loss or damage. The Contractor shall send proper notices, make necessary arrangements, and perform other services required for the care, protection, and in-service maintenance of all plumbing, heating, air conditioning, and ventilating services for the new and existing facilities. The Contractor shall erect temporary barricades, with necessary safety devices, as required to protect personnel from injury, removing all such temporary protection upon completion of the work.
- B. The Contractor shall provide temporary or new services to all existing facilities as required to maintain their proper operation when normal services are disrupted as a result of the work being performed under this project.

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- C. Where existing construction is removed to provide working and extension access to existing utilities, Contractor shall remove doors, piping, conduit, outlet boxes, wiring, light fixtures, air conditioning ductwork and equipment, etc. to provide this access and shall reinstall same upon completion of work in the areas affected.
- D. Where partitions, walls, floors, or ceilings of existing construction are indicated to be removed, all Contractors shall remove and reinstall in locations approved by the Architect/Engineer all devices required for the operation of the various systems installed in the existing construction. This is to include but is not limited to temperature controls system devices, electrical switches, relays, fixtures, piping, conduit, etc.
- E. Outages of services as required by the new installation will be permitted but only at a time approved by the Owner. The Contractor shall allow the Owner two weeks in order to schedule required outages. The time allowed for outages will not be during normal working hours unless otherwise approved by the Owner. All costs of outages, including overtime charges, shall be included in the contract amount.

1.10 DEMOLITION AND RELOCATION

- A. The Contractor shall modify, remove, and/or relocate all materials and items so indicated on the drawings or required by the installation of new facilities. All removals and/or dismantling shall be conducted in a manner as to produce maximum salvage. Salvage materials shall remain the property of the Owner, and shall be delivered to such destination or otherwise disposed of as directed by the Owner. Materials and/or items scheduled for relocation and which are damaged during dismantling or reassembly operations shall be repaired and restored to good operative condition. The Contractor may, at his discretion, and upon the approval of the Owner, substitute new materials and/or items of like design and quality in lieu of materials and/or items to be relocated.
- B. All items which are to be relocated shall be carefully removed in reverse to original assembly or placement and protected until relocated. The Contractor shall clean and repair and provide all new materials, fittings, and appurtenances required to complete the relocations and to restore to good operative order. All relocations shall be performed by workmen skilled in the work and in accordance with standard practice of the trades involved.
- C. When items scheduled for relocation and/or reuse are found to be in damaged condition before work has been started on dismantling, the Contractor shall call the attention of the Owner to such items and receive further instructions before removal. Items damaged in repositioning operations are the Contractor's responsibility and shall be repaired or replaced by the Contractor as approved by the Owner, at no additional cost to the Owner.
- D. Service lines and wiring to items to be removed, salvaged, or relocated shall be removed to points indicated on the drawings, specified, or acceptable to the Owner. Service lines and wiring not scheduled for reuse shall be removed to the points at which reuse is to be continued or service is to remain. Such services shall be sealed, capped, or otherwise tied off or disconnected in a safe manner acceptable to the Owner. All disconnections or connections into the existing facilities shall be done in such a manner as to result in minimum interruption of services to adjacent occupied areas. Services to existing areas or facilities which must remain in operation during the construction period shall not be interrupted without prior specific approval of the Owner as hereinbefore specified.

1.11 SUBSTITUTION OF MATERIALS AND EQUIPMENT

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- A. No substitution of materials or equipment herein specified or called for on the drawings will be permitted, except by written permission of the Owner's Representative. Where several makes of equipment or material are mentioned, any item named may be bid upon provided it meets space, capacity specifications, and other requirements.

1.12 SUBMITTALS

- A. Submittals for Review:
 - 1. As soon as practical or within 30 days after the date of contract award or notice to proceed, and before purchasing or starting installation of any materials or equipment, the Contractor shall submit for review sufficient material and equipment data to indicate that all requirements of the specifications have been met and samples shall be furnished when requested. All manufacturer's data used as part of the submittal shall have all non-applicable features crossed out or deleted in a manner that will clearly indicate exactly what is to be furnished.
 - 2. Four (4) copies of the submittal list and detailed submittals (for the Owner's and A/E's use) shall be submitted to the Owner's Representative. The Contractor is requested to include a minimum of three (3) additional copies for insertion in the project's Owner's Manuals at the completion of the project, and the number of additional copies the Contractor requires for his and his subcontractor's use during the project's construction. The detailed submittals shall be accompanied by the same number of sets of pictorial and descriptive data derived from the manufacturer's catalogs and sales literature, or incorporated in the shop drawings. The Contractor may provide a detailed submittal on any item even though not required by the Owner's Representative.
- B. Format
 - 1. Submittals shall be in pdf format. The first page shall have a cover sheet inserted with the title "MECHANICAL SUBMITTALS" centered in large print. Below the title shall be printed the name of the project, the date, the project location, the name and address of the contractor, the name and address of the subcontractor and the name and address of the engineer(s) in smaller print.
 - 2. Provide a Table of Contents at the beginning of the binder that summarizes the information being submitted according to specification section.
 - 3. Submittals shall be tab divided by specification section; **all sections** identified in the project specifications shall have a tab. When no information is being provided concerning a particular specification section, insert a single dated sheet that explains the circumstances.
 - 4. **Loose-leaf or piecemeal submittals are not acceptable and subject to rejection unless prior approval has been granted by the Engineer.**
- C. Content:
 - 1. The Contractor shall prepare or cause to be prepared shop drawings, product data, materials and equipment lists, diagrams, data, samples, and other submittals as required by the contract documents, hereinafter referred to as "Submittal Data." The Contractor shall review and approve all submittal data for compliance with the contract documents, manufacturer's recommendations, adequacy, clearances, code compliance, safety, and coordination with associated work.
 - 2. The Contractor shall submit approved submittal data to the Owner's Representative for review and comment as to general conformance with the design concept and general compliance with information given in the contract documents. Owner's Representative's review shall not include review of quantities, dimensions, weights or gauges, fabrication processes, construction methods, coordination with other trades or work, or construction safety and precautions, all of which are the sole responsibility of the Contractor.

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3. The Contractor shall clearly and specifically identify and call to the attention of the Owner's Representative any deviation from the contract documents for which Owner acceptance is desired. The responsibility for such a deviation accepted by the Owner shall remain with the Contractor.
 4. Timeliness: The burden of timeliness in the complete cycle of submittal data is on the Contractor. The Contractor shall allow a minimum of four (4) weeks' time frame for review of each submission by the Owner's Representative. The Contractor is responsible for allowing sufficient time in the construction schedule to cover the aforementioned cycles of data processing, including time for all re-submission cycles on nonconforming materials, equipment, etc. covered by the data submitted. Construction delays and/or lack of timeliness in the above regard are the responsibility of the Contractor and will not justify any request for scheduled construction time extensions or extra compensation.
 5. Work performed in accordance with approved submittal date that is not in accordance with the Contract Documents and did not have the specific acceptance of the Owner's Representative shall be replaced at Contractor's cost.
- D. Re-submittals
1. Re-submit entire submittal in accordance with afore mentioned format and content requirements. **Loose-leaf or piecemeal re-submittals are not acceptable.** New and/or revised data for each section shall be prefaced with a colored (yellow, pink, orange, etc) cover sheet that identifies (in a word or two) the materials and/or equipment being re-submitted. Typeset the words "REVISED SUBMITTAL NO. 1 (or 2, 3 as applicable)" centered at the bottom of the cover sheet.
 2. Subsequent re-submittals (second and third, if necessary) shall have different colored cover sheets to distinguish between the various re-submittals.
 3. Include a cover letter at front of binder that specifically responds to each "REVISE AND RE-SUBMIT COMMENT" or "REJECTED" comment by number. Example responses would include the following:
 - a. RESPONSE: "Please see attached re-submittal."
 - b. RESPONSE: "Will be re-submitted at a later date."
 - c. RESPONSE: "Requirement for (xxxxxx) was deleted in Addendum No. 2."
 - d. RESPONSE: "Exception requested based on Section xx, Paragraph x.x.x."
- E. These paragraphs related to Mechanical submittal data supersede any conflicting requirements contained in Division 01 sections.

1.13 CONTRACTOR CERTIFICATION OF SUBMITTAL DATA

- A. The Contractor shall provide the following notarized certificate with all submittal data furnished to the Owner's Representative for review and comment.

Project Title:

Description of Submittal Data:

This is to certify that the above-described submittal data has been reviewed and is approved for compliance with the Contract Documents, manufacturer's recommendation, adequacy, clearances, code compliance, safety, and coordination with other trades and/or work except as follows: (list "none" or itemize and explain). In addition, the Contractor shall submit to the Owner's Representative a signed statement from each representative certifying as follows:

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“I certify that the materials and/or equipment listed below have been personally inspected by the undersigned authorized manufacturer’s representative and is properly installed and operating in accordance with the manufacturer’s recommendations and are asbestos free.”

Name and Company

Notary

1.14 ACCEPTANCE OF MATERIALS AND EQUIPMENT

- A. All equipment installed on this project shall have **local (within 125 miles)** representation, local factory-authorized service, and a local stock of repair parts. This requirement is essential and will be strictly reviewed by the Owner’s Representative prior to concurrence with the Contractor’s approval for all submittals covered by Mechanical sections of this Specification.
- B. NOTICE: The Contractor is responsible for providing materials and equipment that conform to the requirements of the project manual in every respect unless a deviation has been “accepted” in writing. Removal of any nonconforming materials and equipment and the replacement with conforming materials and equipment shall be at the Contractor’s sole expense, regardless of when nonconformance was discovered.
- C. Approval of materials and equipment shall be based on manufacturer’s published data and shall be tentatively subject to the submission of complete shop drawings which comply with the contract documents. Approval is also dependent upon the existence of adequate and acceptable clearances for entry, servicing, and maintenance.
- D. Approval of materials and equipment under this provision shall not be construed as authorizing any deviations from the specifications, unless the attention of the Owner’s Representative has been directed in writing to the specific deviations. Data submitted shall not contain unrelated information unless all pertinent information is properly identified.
- E. Physical Size of Equipment: Space is critical; therefore, equipment of larger sizes than shown, even though of approved manufacturer, will not be acceptable unless it can be demonstrated that ample space exists for proper installation, operation, and maintenance.

1.15 SHOP DRAWINGS

- A. As soon as practicable after the award of contract and approval of materials and equipment, but prior to installation, complete and detailed shop drawings of the following shall be submitted for review and comment:
 - 1. Equipment arrangements.
 - 2. Duct layouts.
 - 3. Piping layouts.
 - 4. Layouts of equipment spaces indicating ductwork and piping larger than 2 inches.
 - 5. Typical fittings and connections.
 - 6. Equipment foundations.
 - 7. Factory-fabricated equipment and materials.
 - 8. Anchors.
 - 9. Control.

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10. Interlock.
 11. Sprinkler locations.
 12. Other details as directed by the Owner's Representative. Composite drawings of areas requiring coordination between trades shall be provided and expedited to eliminate conflicts and to ensure maximum cooperation and work progress.
- B. Work performed without benefit of reviewed and approved shop drawings **will not be recommended for payment by the Engineer** until such time as the shop drawings are submitted, reviewed, and approved. Any work performed without the benefit of reviewed and approved shop drawings may require removal, relocation, and/or replacement at the Contractor's sole expense in order to resolve conflicts between the various systems and provide the performance specified.
- C. All installation of equipment, fixtures, terminal devices, etc. shall be made in accordance with approved composite shop drawings. The Contractor shall modify installation and relocate installed work to provide code clearances, service access, and eliminate conflict with other systems.
- D. Submit one print of shop drawings for each area, floor, system, etc. The print will be marked with the A/E's comments and returned to the Contractor. Contractor shall revise shop drawings, incorporate revisions in field and submit revised shop drawings at project close out.

1.16 SITE OBSERVATION

- A. Site observation by the Architect, Engineer, and/or Owner's Representative is for the express purpose of verifying compliance by the Contractor with the contract documents, and shall not be construed as construction supervision nor indication of approval of the manner or location in which the work is being performed as being a safe practice or place.

1.17 SUPERVISION

- A. In addition to the Superintendent required under the conditions of the contract, each subcontractor shall keep a competent superintendent or foreman on the job at all times.
- B. It shall be the responsibility of each superintendent to study all plans and familiarize himself with the work to be done by other trades. He shall coordinate his work with other trades and, before material is fabricated or installed, make sure that his work will not cause an interference with another trade. Where interferences are encountered, they shall be resolved at the jobsite by the superintendents involved. Where interferences cannot be resolved without major changes to the plans, the matter shall be referred to the Owner's Representative for comments.

1.18 OPERATION PRIOR TO COMPLETION

- A. When any piece of mechanical equipment is operable and it is to the advantage of the Contractor to operate the equipment, he may do so, providing that he properly supervises the operation and has the written permission of the Owner's Representative to do so. The warranty period shall not commence, however, until such time as the equipment is operated for the beneficial use of the Owner or date of substantial completion, whichever occurs first.
- B. Regardless of whether or not the equipment has or has not been operated, the Contractor shall properly clean the equipment, install clean filter media, properly adjust, and complete all

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deficiency list items before final acceptance by the Owner. The date of acceptance and the start of the warranty may not be the same date.

1.19 MANUFACTURER'S RECOMMENDATIONS

- A. The manufacturer's published directions shall be followed in the delivery, storage, protection, installation, piping, and wiring of all equipment and material. The Contractor shall promptly notify the Owner's Representative, in writing, of any conflict between the requirements of the contract documents and the manufacturer's directions, and shall obtain the Owner's Representative's comments before proceeding with the work. Should the Contractor perform any such work that does not comply with the manufacturer's directions or applicable comments from the Owner's Representative, he shall bear all costs arising in connection with the correction of such deficiencies.

1.20 CHECKING AND TESTING MATERIALS AND/OR EQUIPMENT

- A. Before final acceptance of the work, an authorized representative of the manufacturer of the installed materials and/or equipment shall personally inspect the installation and operation of his materials and/or equipment to determine that it is properly installed and in proper operating order. Testing and checking shall be accomplished during the course of the work where required by work being concealed, and at the completion of the work otherwise. In addition, the Contractor shall submit to the Owner's Representative a signed statement from each representative certifying as follows:

"I certify that the materials and/or equipment listed below have been personally inspected by the undersigned authorized manufacturer's representative and is properly installed and operating in accordance with the manufacturer's recommendations and are asbestos free."

- B. Check inspections shall include plumbing, heating, air conditioning, ventilating, mechanical control and electrical equipment, and such other items hereinafter specified or specifically designated by the Owner's Representative.

1.21 OPERATING AND MAINTENANCE INSTRUCTION

- A. The Contractor shall prepare for the owner's manual hereinafter specified complete sets of operating and maintenance instructions, system piping, valving, control and interlock diagrams, manuals, parts lists, etc. for each item of equipment. These are to be assembled as hereinafter specified for owner's manual.
- B. In addition, the Contractor shall provide the service of a competent engineer or a technician acceptable to the Owner's Representative to instruct a representative of the Owner in the complete and detailed operation of all equipment and systems. These instructions shall be provided for a period of sufficient duration to fully accomplish the desired results. Upon completion of these instructions, a letter of release will be required, acknowledged by the Owner, stating the dates of instruction and personnel to whom instructions were given.
- C. Additional diagrams, operating instructions, etc. shall be provided as specified hereinafter in the other sections of these specifications.

1.22 MATERIAL AND EQUIPMENT SCHEDULES

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- A. Contractor shall refer to both drawings and specification for schedules. Where reference is made to items “scheduled on drawings” or “scheduled in specifications,” same shall include schedules contained in both the drawings and the specifications. The Contractor's attention is directed to the various specification sections and drawings for schedules.

1.23 APPLICABLE CODES AND STANDARDS

- A. The installation shall meet the minimum standards prescribed in the latest editions of the following listed codes and standards, which are made a part of these specifications, except as may be hereinafter specifically modified in these specifications and associated drawings.
1. National Fire Protection Association Standards (NFPA):
 - NFPA 10 - Portable Fire Extinguishers
 - NFPA 54 - National Fuel and Gas Code
 - NFPA 70 - National Electrical Code
 - NFPA 90A - Air Conditioning Systems
 - NFPA 101 - Life Safety Code
 - NFPA 255 - Method of Test of Surface Burning Characteristics of Building Materials
 2. American National Standards Institute (ANSI):
 - 15-78 - Safety Code for Mechanical Refrigeration
 - C.2 - 1984 National Electrical Safety Code
 - A117.1 - Handicapped Code
 3. American Society of Mechanical Engineers (ASME): Section IV, V, CSD-1
 4. Air Conditioning and Refrigeration Institute Standards (ARI): All standards related to refrigeration and air conditioning equipment and piping furnished under these specifications.
 5. American Water Works Association (AWWA): All applicable manuals and standards.
 6. Sheet Metal and Air Conditioning Contractors National Associate, Inc, (SMACNA): All applicable manuals and standards.
 7. Air Moving and Conditioning Association (AMCA): All applicable manuals and standards.
 8. American Society of Testing Materials (ASTM): All applicable manuals and standards.
 9. National Electrical Manufacturers' Association (NEMA): All applicable manuals and standards.
 10. Occupational Safety and Health ACT (OSHA):
 - National Sanitation Foundation - Standard No. 2
 11. American Society of Heating, Refrigeration, and Air conditioning Engineers (ASHRAE):
 - ASHRAE 90.1
 12. Americans with Disabilities Act, 1990
 13. American Gas Association (AGA)
 14. Underwriters Laboratories, Inc. (UL)
 15. Manufacturer's Standardization Society of the Valve and Fitting Industry (MSS)
 16. Applicable Local and State Building Codes (International Building Codes, as amended):
 17. Applicable Local and State Mechanical Code (International Mechanical Code, as amended).
 18. Applicable Local and State Plumbing Code (International Plumbing Code, as amended).
 19. Applicable Local and State Energy Code (International Energy Conservation Code, as amended).
 20. Applicable State Gas Code (International Fuel and Gas Code, as amended).
- B. All materials and workmanship shall comply with all applicable city, state, and national codes, specifications, and industry standards. All materials shall be listed by the Underwriters Laboratories, Inc. as conforming to its standards and so labeled in every case where such a standard has been established for the particular type of material in question.

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- C. The contract documents are intended to comply with the aforementioned rules and regulations; however, some discrepancies may occur. Where such discrepancies occur, the Contractor shall immediately notify the Owner's Representative in writing of said discrepancies and apply for an interpretation. Should the discovery and notification occur after the execution of a contract, any additional work required for compliance with said regulations shall be paid for as covered by Division 1 of these contract documents, providing no work or fabrication of materials has been accomplished in a manner of noncompliance. Should the Contractor fabricate and/or install materials and/or workmanship in such a manner that does not comply with the applicable codes, rules, and regulations, the Contractor who performed such work shall bear all costs arising in correcting these deficiencies to comply with said rules and regulations.

1.24 DEFINITIONS

- A. Refer to the condition of the contract for Division 1 for additional requirements regarding definitions.
- B. Where "as required" or "as necessary" is used in these specifications or on the drawings, it shall mean "that situations exist that are not necessarily described in detail or indicated that may cause the Contractor certain coordination requirements in performing the work described or indicated. These coordination requirements entail the normal coordination activities expected of the Contractor where multiple trades are involved and new or existing construction causes deviations to otherwise simplistic approaches to the work to be performed. The term shall not be interpreted to permit an option on the part of the Contractor to achieve the end result."
- C. Where "and/or" is used in these specifications or on the drawings, it shall mean "that situations exist where either one or both conditions occur or are required and shall not be interpreted to permit an option on the part of the Contractor."

1.25 FINAL INSPECTION

- A. Refer to Division 1 for additional requirements for final inspection.
- B. It shall be the responsibility of the Contractor to personally conduct a careful inspection, assuring himself that the work on the project is ready for final acceptance and developing his own "punchlists," before calling upon the Owner's Representative to make a final inspection. Failure of the Contractor to conduct such inspections and provide the Owner's Representative with a copy of his "punchlists" prior to the final inspection shall be adequate cause for the Owner's Representative to cancel any Contractor-requested final inspection.
- C. In order not to delay final acceptance of the work, the Contractor shall conduct his own "final inspections" prior to requesting the Owner's Representative to "final" the project; will have all necessary bonds, guarantees, receipts, affidavits, etc. called for in the various articles of this specification prepared and signed in advance; and together with a letter of transmittal listing each paper included, shall deliver the same to the Owner's Representative at or before the time of said final inspection. The Contractor is cautioned to check over each bond, receipt, etc. before preparing same for submission to see that the terms check with the requirements of the specifications.
- D. The final inspection will be made jointly by the Owner's Representative and the Owner.

1.26 REQUIREMENTS FOR FINAL ACCEPTANCE

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- A. Requirements for final acceptance shall include but not be limited to the Contractor accomplishing the following:
1. Construction: Complete all construction.
 2. Deficiency Lists: Correct all deficiencies listed at time of Substantial Completion.
 3. Owner's Manual: Submit at least 30 days prior to final acceptance on (1) copy of the owner's manual for the Owner's Representative's review and comments. Following acceptance, prepare three (3) copies of bound and indexed owner's manual, to be delivered at the time of final acceptance, which shall include but not be limited to the following:
 - a. System operating instructions.
 - b. System control drawings.
 - c. System interlock drawings.
 - d. System maintenance instructions.
 - e. Manufacturers', suppliers', and subcontractors' names, addresses, and telephone numbers, both local representatives and manufacturers' service headquarters.
 - f. Equipment operating and maintenance instructions and parts lists.
 - g. Manufacturer's certifications (see Checking and Testing Materials and/or Equipment, this section).
 - h. Contractor's warranty.
 - i. Acceptance certificates of authorities having jurisdiction.
 - j. Log of all tests made during course of work.
 - k. Owner's acknowledgment of receipt of instruction, enumerating items in owner's manual.
 - l. List of manufacturers' guarantees executed by the Contractor.
 - m. Certified performance curves.
 - n. Balance and performance test reports.
 - o. Owner's acknowledgment of items of equipment or accessories indicated or specified to be turned over to Owner.
 4. Instructions:
 - a. Verbal, as herein specified.
 - b. Posted, framed under glass or plastic laminated:
 - 1) System operating instructions.
 - 2) System control drawings.
 - 3) System interlock drawings.
 5. Record Drawings: Deliver the specified record drawings to the Owner's Representative.

1.27 RECORD DRAWINGS

- A. The Contractor shall maintain a set of contract drawings (black-line prints) at the jobsite on which he shall indicate the installed (as-built) locations of the following:
1. Equipment
 2. Main lines of piping and ductwork.
 3. Dimensional locations (including depth) of all underground piping, valves and conduits.
- B. Drawings shall be used for construction reference and shall not leave the field office of the jobsite.
- C. Drawings shall include all addenda, ASI's, Change Orders, and existing conditions and equipment that are not reflected in the original contract drawings.
- D. Upon completion of work, the Contractor shall obtain CAD files of the contract drawings from the Owner's Representative and transfer the above as-built information into these files. The as-built files shall be permanently marked "RECORD DRAWINGS" and printed on full-size Mylar sheets.

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Upon completion, the CAD files shall be transferred to CD in AutoCAD 2007 format. Both the CAD files CD and Mylar drawings shall be submitted to the Owner's Representative as part of the Close-out Submittals.

- E. Refer to Division 1 paragraph entitled "Record Documents" for additional requirements.

1.28 ALLOWANCES

- A. Refer to Division 1 for allowances.

1.29 ALTERNATE PROPOSALS

- A. Alternate proposals are summarized in Division 1 and on the bid proposal form. Refer to all sections of the specifications and the drawings to determine the exact extent and scope of the various alternate proposals as each pertains to the work of the various trades.

1.30 WARRANTY

- A. General: All work performed (including equipment and materials furnished) under the various sections of these specifications shall be 100% warranted, for a period of one (1) year from the date of final acceptance thereof, against defective materials, design, and unauthorized substitution. Upon receipt of note of failure of any part of the guaranteed equipment and/or facilities during the warranty period, the affected part(s) or facilities shall be replaced promptly with new parts, etc. by and at the expense of the Contractor. Further, the Contractor shall properly obtain, execute, and forward any and all manufacturer's warranties on equipment furnished under the Contract. Refer to Division 1 for additional requirements.
- B. Extended Period: The Contractor shall provide all extended time warranties available from the manufacturer of the equipment provided as standard at no additional cost. This includes all extended warranties where specified with certain equipment as directed in other sections of this Specification.

PART 2 - PRODUCTS

2.1 MATERIALS AND WORKMANSHIP

- A. All materials, unless otherwise specified, shall be current United States manufacture, new, free from all defects, and of the best quality. Foreign goods specifically approved for use by the Owner's Representative prior to bidding may be furnished.
- B. Materials and equipment shall be installed in accordance with the manufacturer's recommendations and the best standard practice for the type of work involved. All work shall be executed by mechanics skilled in their respective trades, and the installations shall present a neat, precise appearance.
- C. The responsibility for the furnishing and installation of the proper mechanical equipment and/or material as intended rests entirely upon the Contractor. The Contractor shall request advice and supervisory assistance from the representative of specific manufacturers during the installation.

2.2 FLAME SPREAD AND SMOKE DEVELOPED PROPERTIES OF MATERIALS

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- A. Duct coverings, duct linings, vapor barrier facings, tapes, adhesives, core materials, insulation, jackets, piping (of any sort), and other materials in concealed locations, including any above-ceiling area, shall have a flame spread rating not over 25 without evidence of continued progressive combustion and a smoke developed rating no higher than 50. Flame spread and smoke developed ratings shall be in accordance with NFPA Standard No. 255.

2.3 BEARINGS

- A. All ball bearings shall be of radial and/or thrust type, and enclosed in a dust and moisture-proof housing.

2.4 MOTORS

- A. The Contractor shall provide all motors required for equipment supplied under each portion of the work. Motors shall be premium efficiency and be built in accordance with the latest ANSI, IEE, and NEMA standards, shall be fully coordinated with the equipment served, shall be of sizes and electrical characteristics scheduled.

2.5 STARTING EQUIPMENT

- A. Each motor shall be provided with proper starting equipment. This equipment, unless hereinafter specified or scheduled to the contrary, shall be provided by the trade furnishing the motor. All motor starting equipment provided by any one trade shall be of the same manufacture unless such starting equipment is an integral part of the equipment on which the motor is mounted.

2.6 LOW VOLTAGE (CONTROLS/THERMOSTAT) WIRING

- A. All low voltage wiring installed by the Mechanical Contractor, Electrical Contractor or Controls Vendor shall be run in a neat and workmen like manner, parallel and perpendicular to building lines on J-Hooks (above ceiling grid only). Plenum rated cable shall be installed above ceilings. All other locations (exposed, Mechanical Rooms, outdoors or above hard lid ceiling) should be installed in conduit.

2.7 SLEEVES, INSERTS, AND FASTENINGS

- A. General: Proper openings through floors, walls, roofs, etc. for the passage of piping, ductwork, conduits, etc. shall be provided. All piping and conduit through floors and piping through walls must pass through sleeves except soil pipe installed under concrete slabs-on-fill, and pipe and conduit that is cast-in-place. Sleeves shall be set in new construction before concrete is poured, as cutting holes through any part of the concrete will not be permitted unless acceptable to the Owner's Representative.
- B. Aboveground, Exterior-Wall, Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe 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.

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- C. 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.
- D. Sleeves: The minimum clearance between horizontal pipe, including insulation where applicable, and sleeve shall be 1/4 inch, except that the minimum clearance shall be 2 inches where piping contacts the ground. Sleeves through floors shall extend 3/4 inch above the floor; sleeves through walls and partitions shall be installed flush with exposed surfaces.
- E. Materials: Install sleeves large enough to provide 1/4” annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - 1. Steel Pipe Sleeves: For pipes smaller than 6-inch NPS.
 - 2. Steel, Sheet-Metal Sleeves: For pipes 6-inch NPS and larger, penetrating gypsum-board partitions.
 - 3. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.
 - a) Seal space outside of sleeve fittings with non-shrink, nonmetallic grout.
- F. Inserts: Suitable concrete inserts for pipe, conduit, and equipment hangers shall be set and properly located for all piping, conduit, and equipment to be suspended from concrete construction.
- G. Fasteners: Fastening of pipes, conduits, etc. in the building shall be as follows:
 - 1. To wood members: by wood screws.
 - 2. To masonry and concrete: by threaded metal inserts, metal expansion screws, or toggle bolts, whichever is appropriate for the particular type of masonry or concrete.
 - 3. To steel: machine screws or welding (when specifically permitted or directed), or bolts.
NOTE: Under no circumstances will the use of plastic anchors or plastic expansion shields be permitted for any purpose whatsoever.
- H. Ratproofing: The open space around all piping, ductwork, etc. passing through the ground floor and/or exterior walls shall be ratproofed in a manner acceptable to the Owner’s Representative.
- I. Weatherproofing: The annular space between a pipe and its sleeve in exterior walls or through floor to below grade shall be filled with polyurethane foam rods 50% greater in diameter than the space as backing and fill material and made watertight with a permanent elastic polysulfide compound. Seal both surfaces of wall or floor with a fire-resistant sealant.
- J. Air Plenums: The space around piping, ductwork, etc. passing through an air plenum shall be made airtight in a manner acceptable to the Owner’s Representative. The sealant used must be fire resistant.

2.8 FIRE AND SMOKE PARTITION, WALL, AND/OR FLOOR PENETRATIONS

- A. Pipe, ductwork, conduit, etc. shall pass through fire- or smoke-rated floors, partitions, walls, or other barriers within a UL-listed assembly which shall maintain the rating of the applicable wall, floor, partition, or barrier.
- B. The Contractor shall review the architectural and structural drawings and determine the location of the fire-rated building elements. Where these elements are penetrated, UL-listed fire-rated

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penetration assemblies approved by the local authority shall be provided in accordance with the manufacturer's instructions to obtain the required rating.

2.9 METAL BUILDING SYSTEMS/MECHANICAL-ELECTRICAL SUPPORTS

- A. Metal building systems are required to be designed by the manufacturer to accommodate and support the mechanical systems indicated on the mechanical drawings and specified in Mechanical specifications.
- B. The metal building systems manufacturer is required to provide the following:
 - 1. Framed openings through the roofs with supports, roof curbs, and flashings for roof-mounted equipment, fans, vents, and air intakes.
 - 2. Structural support for piping, conduits, and suspended equipment consisting of beam, joists, purlins, and/or blocking above and perpendicular to pipe routes and equipment hangers at intervals not to exceed 8 feet.
 - 3. Structural support for suspended ceilings, diffusers, grilles, light fixtures including associated raceways and ductwork.
- C. The mechanical trade shall:
 - 1. Provide all routes, weights, installation heights, opening locations, etc. for all equipment, piping, vents, etc. to the metal building system manufacturer and coordinate requirements for structural supports, hangers, attachments, etc. with the metal building systems manufacturer.
 - 2. Provide all supporting devices (hangers, attachments, brackets, cross beams, etc.) to attach to the metal building structural system.

2.10 FOUNDATIONS / HOUSEKEEPING PADS

- A. General: All special foundations and supports required for the proper installation of equipment and pipe shall be provided as hereinafter specified and under the section of the specifications covering the equipment, unless otherwise indicated on the drawings.
- B. All mechanical equipment shall receive concrete housekeeping pads unless otherwise noted. Equipment to receive pads are to include (but not limited to): air handlers, fan-coils, condensing units, boilers, water heaters, water softeners, expansion / compression tanks, filter feeders, water treatment equipment, air compressors, fans, pumps (in addition to inertia bases where required), chillers, surge tanks, deaerators, etc.
- C. Concrete foundations for the support of equipment such as floor-mounted pumps, fans, etc. shall be not less than 5½ inches high and not less than 4 inches larger (in both directions) than supported unit, unless otherwise noted and shall be poured in forms built of new dressed lumber. All corners of the foundations shall be neatly chamfered by means of sheet metal or triangular wood strips nailed to the form. Pads shall not be laid out directly against walls or structures. 2 inches shall be left available for pad form work. Foundation bolts shall be placed in the forms when the concrete is poured, the bolts being correctly located by means of templates. Allow 1 inch below the equipment bases for alignment and grouting (where applicable). Foundations for equipment located on the exterior of the building shall be provided as indicated. Foundations shall be constructed in accordance with approved shop drawings and shall be reinforced with #4 bars at 12 inches on center both ways (minimum).
- D. Pipe and Conduit Support: All pipes and conduits throughout the building, both horizontal and vertical, shall be adequately supported from the construction to line of grade, with proper provision for expansion, contraction, vibration elimination, and anchorage. Vertical pipes and

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conduits shall be supported from floor lines with riser clamps sized to fit the lines and to adequately support their weight. At the bases of lines, where required for proper support, provide anchor base fittings or other approved supports.

2.11 ACCESS DOORS

- A. General: Provide access doors for all serviceable mechanical appurtenances (valves, trap primers, shock arresters, volume dampers, fire/smoke dampers, actuators, sensors, etcetera) in inaccessible locations. Such locations include gypsum, brick and CMU ceilings and walls.
- B. Location of panels shall be carefully coordinated with other Exposed Devices as described in earlier paragraphs.
- C. Manufacturers shall be Inland-Milcor, Bilco, Miami Carey, or approved equal. Unless indicated otherwise, use panels equal to Milcor Style M for masonry and drywall construction, equal to Milcor Style K for plastered masonry walls and ceilings. Stainless steel panels shall be used in ceramic tile or glazed structural tile.
- D. Minimum construction features include 14-gage frame and door, continuous hinges, cam-style latch and 10x10" unobstructed opening size.
- E. UL labeled when in fire-rated construction, one and one-half hour rating.
- F. Access doors located outside, in restrooms or in a moisture-laden environment (dressing area, shower area, lockers, etc.) shall be stainless steel construction.
- G. Equipment access doors shall be of sufficient size to remove/replace equipment and provide routine maintenance as necessary, unless otherwise noted. Doors shall be set flush with adjacent finish surfaces. Exterior doors shall be provided with cylinder locks.
- H. Access doors into ductwork shall be 14-gauge insulated galvanized steel with 16-gauge galvanized gasketed steel frame and cam-type locks. Ductwork access door shall be a minimum of 12" x 12" in size.

2.12 FLOOR AND CEILING PLATES

- A. Except as otherwise noted, provide one-piece chrome-plated brass floor and ceiling plates (or escutcheons) around all pipes, conduits, etc. passing through walls, floors, or ceilings in any spaces, except underfloor and attic spaces. Plates shall be sized to fit snugly against the outside of the pipe or against the outside of insulation on lines which are insulated, and positively secured to such pipe or insulation. Plates will not be required for piping where pipe sleeves extend ¾ of an inch above finish floor and are concealed. Plates shall be one piece.

PART 3 - EXECUTION

3.1 SPACE AND EQUIPMENT ARRANGEMENT

- A. The size of mechanical equipment indicated on the drawings is based on the dimensions of a particular manufacturer. While other manufacturers will be acceptable, it is the responsibility of the Contractor to determine whether the equipment he proposes to furnish will fit in the space.

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Shop drawings shall be prepared when required by the Owner's Representative to indicate a suitable arrangement.

- B. All equipment shall be installed in a manner to permit access to all surfaces. All valves, motors, drives, filters, and other accessory items shall be installed in a position to allow removal for service without disassembly of another part.

3.2 LARGE APPARATUS

- A. Any large piece of apparatus which is to be installed in any space in the building, and which is too large to permit access through stairways, doorways, or shafts shall be brought to the job and placed in the space before the enclosing structure is completed. Following placement in the space, such apparatus shall be thoroughly, completely protected from damage as hereinafter specified.

3.3 PROTECTION

- A. The Contractor shall take such precautions as may be necessary to properly protect all materials and equipment from damage from the time of delivery until the completion of work. This shall include the erection of all required temporary shelters and supports to adequately protect any items stored in the open on the site from the weather, the ground and surrounding work; the cribbing of any items above the floor of the construction; and the covering of items in the uncompleted building with tarpaulins or other protective covering. Failure on the part of the Contractor to comply with the above will be sufficient cause for the rejection of the items in question.
- B. The Contractor shall protect existing facilities, the work of others, and the premises from any and all damages that may be made possible by the execution of work.
- C. Equipment and materials shall be protected from rust both before and after installation. Any equipment or materials found in a rusty condition at the time of final inspection must be cleaned of rust and repainted as specified elsewhere in these specifications.

3.4 COOPERATION BETWEEN TRADES AND WITH OTHER CONTRACTORS

- A. Each trade, subcontractor, and/or Contractor must work in harmony with the various trades, subcontractors, and/or Contractors on the job as may be required to facilitate the progress to the best advantage of the job as a whole. Each trade, subcontractor, and/or Contractor must pursue its work promptly and carefully so as not to delay the general progress of the job. This Contractor shall work in harmony with Contractors working under other contracts on the premises.
- B. It shall be the responsibility of each trade to cooperate fully with the other trades on the job to help keep the jobsite in a clean and safe condition. At the end of each day's work, each trade shall properly store all of its tools, equipment, and materials and shall clean its debris from the job. Upon the completion of the job, each trade shall immediately remove all of its tools, equipment, any surplus materials, and all debris caused by its portion of the work.

3.5 PRECEDENCE OF MATERIALS AND COORINATION OF WORK

- A. These specifications and the accompanying drawings are intended to cover systems which will not interfere with the structural design of the building, which will fit into the several available

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- spaces, and which will ensure complete and satisfactory systems. Each subcontractor and/or trade shall be responsible for the proper fitting of his material and apparatus into the building.
- B. The work of the various trades shall be performed in the most direct and workmanlike manner without hindering or handicapping the work of other trades. Piping interferences shall be handled by giving precedence to pipe lines which require a stated grade for proper operation. Where space requirements conflict, the following order or precedence shall, in general, be observed:
1. Building lines.
 2. Structural members.
 3. Light fixtures.
 4. Soil and drain piping.
 5. Condensate drains.
 6. Vent piping.
 7. Supply, return, and outside air ductwork.
 8. Exhaust ductwork.
 9. HVAC water and steam piping.
 10. Steam condensate piping.
 11. Fire protection piping.
 12. Natural gas piping.
 13. Domestic water (cold and hot).
 14. Refrigerant piping.
 15. Electrical conduit.
- C. The light fixture grid layout as indicated on the drawings must be maintained. This Contractor shall refer to all light fixture plans and details indicated on the drawings and shall coordinate the location of dampers, supply grilles, return air grilles, sprinkler heads, etc. with the location of the light fixtures to assure proper access to all items in a manner acceptable to the Owner's Representative.
- D. The electrical trades shall locate all junction boxes, pull boxes, conduits, etc. to avoid interference with the diffusers, dampers, grilles, etc. hereinbefore mentioned. The mechanical trades shall furnish to all other trades copies of approved ductwork shop drawings to assist in the coordination of the rough-in and installation of all items of work.

3.6 CONNECTIONS FOR OTHERS

- A. This Contractor shall rough-in for and make all water, sewer, electrical, etc. connections to all fixtures, equipment, machinery, etc. provided by others in accordance with detailed roughing-in drawings provided by the equipment suppliers, by actual measurements of the equipment connections, or as detailed.
- B. After the equipment is set in place, this Contractor shall make all final connections and shall provide all required pipe, fittings, valves, traps, connectors, etc.
- C. Provide all air gap fittings required, using materials hereinbefore specified. In each water line serving an item of equipment or piece of machinery, provide a shutoff valve. On each drain without integral trap provide a suitable trap.
- D. All pipe fittings, valves, traps, etc. exposed in finished areas and connected to chrome-plated lines provided by others shall be chrome-plated to match.
- E. Provide all sheet metal ducts, transition pieces, etc. required for a complete installation of equipment provided by others.

3.7 INSTALLATION METHODS

- A. Where to Conceal: All pipes and conduits shall be concealed in pipe chases, walls, furred spaces, below suspended floors, or above the ceilings of the building unless otherwise indicated.
- B. Where to Expose: In mechanical rooms, janitor's closets tight against pan soffits in exposed Tee structures, or storage spaces, but only where necessary, piping and conduit may be run exposed. All exposed piping and conduit shall be run in the neatest, most inconspicuous manner, and parallel or perpendicular to the building lines.
- C. Support: All piping and conduit shall be adequately and properly supported from the building structure by means of hanger rods or clamps to walls as herein specified.
- D. Maintaining Clearance: Where limited space is available above the ceilings and below concrete beams or other deep projections, pipe and conduit shall be sleeved through the projection where it crosses, rather than hung below them, in a manner to provide maximum above-floor clearance. Sleeves shall be as herein specified. Approval shall be obtained from the Owner's Representative for each penetration.
- E. All pipe, conduits, etc. shall be cut accurately to measurements established at the building and shall be worked into place without springing or forcing. All ducts, pipes, and conduits run exposed in machinery and equipment rooms shall be installed parallel to the building lines, except that they shall be sloped to obtain the proper pitch. Piping and ducts run in furred ceilings, etc. shall be similarly installed, except as otherwise shown. Conduits in furred ceilings and in other concealed spaces may be run at angles to the construction but shall be neatly grouped and racked indicating good workmanship. All conduit and pipe openings shall be kept closed until the systems are closed with final connections.
- F. Special Requirements:
 - 1. There shall be no pipe joints nearer than 12 inches to a wall, ceiling, or floor penetration unless pipe joint is a welded or mechanically-coupled-type joint.
 - 2. The Contractor shall study all construction documents and carefully lay out all work in advance of fabrication and erection in order to meet the requirements of the extremely limited spaces. Where conflicts occur the Contractor shall meet with all involved trades and the Owner's Representative and resolve the conflict prior to erection of any work in the area involved.
 - 3. All piping not directly buried in the ground shall be considered as "interior piping."
 - 4. Prior to the installation of any ceiling material, gypsum, plaster, or acoustical board, the Contractor shall notify the Owner's Representative so that arrangements can be made for an inspection of the above-ceiling area about to be "sealed off." The Contractor shall give as much advance notice as possible up to ten (10) working days, but in no case less than five (5) working days.
 - 5. The purpose of this inspection is to verify the completeness and quality of the installation of the air conditioning systems, the plumbing systems, and any other special above-ceiling systems such as pneumatic tube. The ceiling supports (tee bar or lath) should be in place so that access panel and light fixture locations are identifiable and so that clearances and access provisions may be evaluated.
 - 6. No ceiling material shall be installed until the deficiencies listed from this inspection have been corrected to the satisfaction of the Owner's Representative.

3.8 CUTTING AND PATCHING

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- A. General: Cut and patch walls, floors, etc. resulting from work in existing construction or where made necessary by failure to provide proper openings or recesses in new construction.
- B. Methods of Cutting: Openings cut through concrete and masonry shall be made with masonry saws and/or core drills and at such locations acceptable to the Owner's Representative. Impact-type equipment will not be used except where specifically acceptable to the Owner's Representative. Openings in concrete for pipes, conduits, outlet boxes, etc. shall be core drilled to exact size. **Determine location of embedded conduit and reinforcing bars prior to cutting.**
- C. Restoration: All openings shall be restored to "as-new" condition under the appropriate specification section for the materials involved, and shall match remaining surrounding materials and/or finishes.
- D. Masonry: Where openings are cut through masonry walls, provide and install lintels or other structural supports to protect the remaining masonry. Adequate supports shall be provided during the cutting operation to prevent any damage to the masonry occasioned by the operation. All structural members, supports, etc. shall be of the proper size and shape, and shall be installed in a manner acceptable to the Owner's Representative.
- E. Plaster: All mechanical work in area containing plaster shall be completed prior to the application of the finish plaster coat. Cutting of finish plaster coat will not be permitted.
- F. Weakening: No cutting, boring, or excavating which will weaken the structure shall be undertaken.

3.9 ROOF PENETRATIONS AND FLASHING

- A. Pipe and conduit ducts, pitch pockets, curb bases, and flashing compatible with the roofing installation shall be provided for roof penetrations. Provide framing or other support around all openings through roof as required to preserve the structural integrity of the roof system and make the penetration weathertight.
- B. Provide 30-inch round or square flashing acceptable to the roofing trades at all roof and deck drain and sleeve flashing locations.
- C. Roof curbs for all roofs except standing seam metal roofs shall be provided by the equipment supplier supplying the roof-mounted equipment, etc., and such curbs shall be installed by the roofing trades. Contractor shall coordinate all roof curb requirements with all trades and the roofing trades at the earliest possible stage of the project.
- D. Roof curbs for standing seam metal roofs shall be provided by the roofing trades. Curb base size, height, and type shall be coordinated with the roofing trades at the earliest possible stage of the project.
- E. Flashing for pipe and conduit penetrations of standing seam metal roofs shall be provided and installed by the roofing trades.

3.10 EXCAVATING AND BACKFILLING

- A. Perform trenching, excavating, backfilling for mechanical work as set forth below.

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- B. Depth of excavation to provide a minimum of 3 feet above top of pipe. Excavation to be carried to a depth of at least 6 inches below bottom of pipe elevation. Fill below pipe (6 inches), around pipe, and a minimum of 12 inches above pipe with sand of Class "B" crushed stone tamped firm and even. Separate topsoil during excavation. Final layer of dirt (12 inches minimum) to be topsoil. Trenches to be at least 18 inches wider than pipe with batter boards placed every 25 feet. Backfilling shall be done to exclude use of rock or stone above sand or Class "B" crushed stone.

3.11 TESTS AND INSPECTIONS

- A. General: The Contractor shall make all tests deemed necessary by the inspection departments of the authority having jurisdiction, Board of Underwriters, etc. He shall provide all equipment, materials, and labor for making such tests. Fuel and electrical energy for system operational tests following beneficial occupancy by the Owner will be paid for by the Owner.
- B. Other: Additional tests specified hereinafter under the various specifications sections shall be made.
- C. Notification: The Owner's Representative shall be notified at his office 36 hours prior to each test and other specifications requirements requiring action on the part of the Owner, Architect, Engineer, and/or Owner's Representative.
- D. Test Logs: All tests which the Contractor conducts shall have pertinent data logged by the Contractor at the time of testing. Data shall include date, time, personnel, description and extent of system tested, test conditions, test results, specified results, and any other pertinent data. Data shall be delivered to the Owner's Representative as specified under "Requirements for Final Acceptance.
- E. Inspections: In general, an inspection by the Owner's Representative shall be required prior to closing up any work and prior to beneficial occupancy or final project completion. The closing up of work includes, but is not limited to, pipe and conduit installations prior to backfilling; mechanical, electrical, and fire protection work prior to placement of concrete; or closing up walls and overhead mechanical, electrical, and fire protection work prior to installation of the ceiling.

3.12 CLEANING AND PAINTING

- A. Thoroughly clean and touch up the finish on all parts of the materials and equipment. Exposed parts in equipment rooms, and all other spaces except sealed chases and attics shall be thoroughly cleaned of cement, plaster, and other materials, and all oil and grease spots shall be removed. Such surfaces shall be carefully wiped and all cracks and corners scraped out.
- B. Exposed metal work which is not galvanized shall be carefully brushed down with steel brushes to remove rust and other spots and left smooth and clean and then painted with a suitable rust resistant primer. Exposed metal work includes work exterior to the building; exposed in mechanical or electrical equipment rooms and storage rooms; and other areas where occupants could see the work, whether normally occupied or not.
- C. All other painting shall be accomplished under the Painting Section of Division 9 of the specifications.

3.13 DISCHARGE OF WASTES FROM CONSTRUCTION SITE

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- A. The Contractor shall comply with all applicable provisions of local, state, and federal laws regarding the discharge of wastes into sewer and waterways. Special caution shall be exercised to prevent the discharge of wastes which contain oil, tar, asphalt, roofing compound, kerosene, gasoline, paint, mud, cement, lime, or other materials which would degrade the water quality of the receiving water course. The Contractor shall construct and maintain oil interceptors, settling basins, acid neutralization tanks, and/or other effective pollution countermeasures, as required by the Texas Water Quality Board.

END OF SECTION 230100

SECTION 230513

BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following basic mechanical materials and methods to complement other Mechanical Sections.
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. Concrete base construction requirements.
 - 3. Escutcheons.
 - 4. Dielectric fittings.
 - 5. Dielectric isolation tape
 - 6. Flexible connectors.
 - 7. Mechanical sleeve seals.
 - 8. Nonshrink grout for equipment installations.
 - 9. Field-fabricated metal and wood equipment supports.
 - 10. Installation requirements common to equipment specification sections.
 - 11. Mechanical demolition.
 - 12. Cutting and patching.
 - 13. Touchup painting and finishing.
 - 14. Access Doors
- B. Pipe and pipe fitting materials are specified in mechanical piping system Sections, if applicable.

1.2 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:
 - 1. ABS: Acrylonitrile-butadiene-styrene plastic.
 - 2. CPVC: Chlorinated polyvinyl chloride plastic.
 - 3. NP: Nylon plastic.

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4. PE: Polyethylene plastic.
 5. PVC: Polyvinyl chloride plastic.
- G. The following are industry abbreviations for rubber materials:
1. CR: Chlorosulfonated polyethylene synthetic rubber.
 2. EPDM: Ethylene propylene diene terpolymer rubber.

1.3 SUBMITTALS

- A. Product Data: For dielectric fittings, flexible connectors, access doors, solder/brazing material and mechanical sleeve seals.
- B. Shop Drawings: Detail fabrication and installation for metal and wood supports and anchorage for mechanical materials and equipment.
- C. 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. Clearances for servicing and maintaining equipment, accessories, and specialties, including space for disassembly required for periodic maintenance.
 2. Equipment and accessory service connections and support details.
 3. Fire-rated wall and floor penetrations.
 4. Scheduling, sequencing, movement, and positioning of large equipment into building during construction.
 5. Access panel and door locations

1.4 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.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and prevent entrance of dirt, debris, and moisture.
- B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.
- C. Protect flanges, fittings, and piping specialties from moisture and dirt.
- D. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

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1.6 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.
- 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Dielectric Tape:
 - a. Holdrite (#272-4).
 - 2. Metal, Flexible Connectors:
 - a. Flexicraft Industries.
 - b. Flex-Hose, Co., Inc.
 - c. Grinnell Corp.; Grinnell Supply Sales Co.
 - d. Mercer Rubber Co.
 - e. Metraflex Co.
 - f. Uniflex, Inc.
 - 3. Rubber, Flexible Connectors:
 - a. General Rubber Corp.
 - b. Mercer Rubber Co.
 - c. Metraflex Co.
 - d. Red Valve Co., Inc.
 - e. Uniflex, Inc.
 - 4. Mechanical Sleeve Seals:
 - a. Calpico, Inc.
 - b. Metraflex Co.
 - c. Thunderline/Link-Seal.

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2.2 PIPE AND PIPE FITTINGS

- A. Refer to individual Specification piping Sections for pipe and fitting materials and joining methods, if applicable.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

- A. Refer to individual Specification piping Sections for special joining materials not listed below, if applicable.
- B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness, unless thickness or specific material is indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 - 2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- E. Solder Filler Metals: ASTM B 32.
 - 1. ASTM B 32, 95/5 lead-free alloys. Include water –flushable and soluble flux according to ASTM B 813.
- F. Brazing Filler Metals: AWS A5.8.
 - 1. BCuP Series: Copper-phosphorus alloys.
 - 2. BAg1: Silver alloy.
- G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- H. Solvent Cements: Manufacturer's standard solvent cements for the following:
 - 1. CPVC Piping: ASTM F 493.
 - 2. PVC Piping: ASTM D 2564, medium bodied (bond). Include purple primer according to ASTM F 656.
- I. Plastic Pipe Seals: ASTM F 477, elastomeric gasket.
- J. Flanged, Ductile-Iron Pipe Gasket, Bolts, and Nuts: AWWA C110, rubber gasket, carbon-steel bolts and nuts.
- K. Couplings: Iron-body sleeve assembly, fabricated to match OD of plain-end, pressure pipes.
 - 1. Sleeve: ASTM A 126, Class B, gray iron.
 - 2. Followers: ASTM A 47 malleable iron or ASTM A 536 ductile iron.
 - 3. Gaskets: Rubber.
 - 4. Bolts and Nuts: AWWA C111.
 - 5. Finish: Enamel paint.

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2.4 DIELECTRIC FITTINGS

- A. General Requirements: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature, to prevent galvanic action and stop corrosion. Unions in first paragraph below are available in at least NPS 1/2 to NPS 2.

- B. Dielectric Unions:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Capitol Manufacturing Company.
 - b. Central Plastics Company.
 - c. EPCO Sales, Inc.
 - d. Hart Industries International, Inc.
 - e. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - f. Zurn Mechanical Products Group; Wilkins Water Control Products.
 - 2. Description:
 - a. Pressure Rating: 250 psig at 180 deg F.
 - b. End Connections: Solder-joint copper alloy and threaded ferrous.
 - c. Flanges in first paragraph below are available in at least NPS 1-1/2 to NPS 4.

- C. Dielectric Flanges:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Capitol Manufacturing Company.
 - b. Central Plastics Company.
 - c. EPCO Sales, Inc.
 - d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - 2. Description:
 - a. Factory-fabricated, bolted, companion-flange assembly.
 - b. Pressure Rating: 175 psig minimum.
 - c. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

- D. Dielectric-Flange Kits:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Advance Products & Systems, Inc.
 - b. Calico, Inc.
 - c. Central Plastics Company.
 - d. Pipeline Seal and Insulator, Inc.
 - 2. Description:
 - a. Nonconducting materials for field assembly of companion flanges.
 - b. Pressure Rating: 150 psig.
 - c. Gasket: Neoprene or phenolic.
 - d. Bolt Sleeves: Phenolic or polyethylene.
 - e. Washers: Phenolic with steel backing washers.

- E. Dielectric Couplings:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Calpico, Inc.
 - b. Lochinvar Corporation.

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2. Description:
 - a. Galvanized-steel coupling.
 - b. Pressure Rating: 300 psig at 225 deg F.
 - c. End Connections: Female threaded.
 - d. Lining: Inert and noncorrosive, thermoplastic.
- F. Dielectric Nipples:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Perfection Corporation; a subsidiary of American Meter Company.
 - b. Precision Mechanical Products, Inc.
 - c. Victaulic Company.
 2. Description:
 - a. Electroplated steel nipple complying with ASTM F 1545.
 - b. Pressure Rating: 300 psig at 225 deg F.
 - c. End Connections: Male threaded or grooved.
 - d. Lining: Inert and noncorrosive, propylene.

2.5 DIELECTRIC ISOLATION TAPE

- A. Tape to eliminate dissimilar metal contact: (equal to Holdrite #272-4)
 1. White Polyester Felt. Pressure sensitive adhesive rubber base (one side only).
 2. 4" width.

2.6 FLEXIBLE CONNECTORS

- A. General: Fabricated from materials suitable for system fluid and that will provide flexible pipe connections. Include 125-psig minimum working-pressure rating, unless higher working pressure is indicated, and ends according to the following:
 1. 2-Inch NPS and Smaller: Threaded.
 2. 2-1/2-Inch NPS and Larger: Flanged.
 3. Option for 2-1/2-Inch NPS and Larger: Grooved for use with keyed couplings.
- B. Bronze-Hose, Flexible Connectors: Corrugated, bronze, inner tubing covered with bronze wire braid. Include copper-tube ends or bronze flanged ends, braze welded to hose.
- C. Rubber, Flexible Connectors: CR or EPDM elastomer rubber construction, with multiple plies of NP fabric, molded and cured in hydraulic presses. Include 125-psig minimum working-pressure rating at 220 deg F. Units may be straight or elbow type, unless otherwise indicated.

2.7 MECHANICAL SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, used to fill annular space between pipe and sleeve.
 1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe materials and size of pipe.
 2. Pressure Plates: Stainless steel.
 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

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2.8 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.
 - 5. Sleeve Fasteners: Manufactured, steel clips for securement during pour. Equal to B-line, BD40, BE-5-8 or BE-9-12.
- 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. (split face acceptable for existing piping)
 - a. Finish: Polished chrome-plate.

2.9 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-psig, 28-day compressive strength.
 - 3. Packaging: Premixed and factory packaged.

2.10 ACCESS DOORS

- A. General: Provide access doors for all serviceable mechanical appurtenances (valves, trap primers, shock arresters, actuators, sensors, etcetera) in inaccessible locations. Such locations include gypsum, brick and CMU ceilings and walls.
- B. Location of panels shall be carefully coordinated with other Exposed Devices as described in earlier paragraphs.
- C. Manufacturers shall be Milcor, Mifab, or approved equal. Unless indicated otherwise, use panels equal to Milcor Style M for masonry and drywall construction, equal to Milcor Style K for plastered masonry walls and ceilings. Stainless steel panels shall be used in ceramic tile or glazed structural tile.
- D. Minimum construction features include 16-gage frame and door, continuous hinges, cam-style latch and 10x10" unobstructed opening size.
- E. UL labeled when in fire-rated construction, one and one-half hour rating.
- F. Access doors located outside, in restrooms or in a moisture-laden environment (dressing area, shower area, lockers, etcetera) shall be stainless steel construction.

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- G. Equipment access doors shall be of sufficient size to remove/replace equipment and provide routine maintenance as necessary, unless otherwise noted. Doors shall be set flush with adjacent finish surfaces. All access doors shall be provided with cylinder locks. All access doors (MEP) shall have one (1) common key.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS AND APPLICATIONS

- A. General: Install piping as described below, unless piping Sections specify otherwise. Individual piping 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. All piping to be installed in compliance with current NEC required clearances.
- D. Install manufactured isolation clamps at all dissimilar metal pipe supports. Install dielectric isolation tape (engineer approved) only when a manufactured isolation clamp is not available.
- E. Install piping at indicated slope.
- F. Install components with pressure rating equal to or greater than system operating pressure.
- G. Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.
- H. Install piping free of sags and bends.
- I. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.
- J. 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.
- K. Install piping to allow application of insulation plus 1-inch clearance around insulation.
- L. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
- M. Install fittings for changes in direction and branch connections.
- N. Install couplings according to manufacturer's written instructions.
- O. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements in Section "Penetration Firestopping" for firestop materials and installations.
 - 1. Fire-stop all sleeves at floor penetrations of multistory buildings including underfloor penetrations.
- P. Verify final equipment locations for roughing-in.

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- Q. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.
- R. 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. CPVC Piping: ASTM D 2846 and ASTM F 493.
 - c. PVC Pressure Piping: ASTM D 2672.
 - d. PVC Nonpressure Piping: ASTM D 2855.
 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.

3.2 ESCUTCHEON REQUIREMENTS

- A. Install escutcheons at pipe penetrations of walls, ceilings, and floors in finished areas.
1. Escutcheons for New Piping:

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- a. Piping exposed through floors and walls in finished areas: One piece, cast brass with polished chrome-plated finish with set screw. Deep escutcheons to be provided where standard depth will not fit.
- b. Escutcheons shall cover entire hole penetration.
- c. Escutcheon to be appropriately sized for pipe.
2. Escutcheons for Existing piping:
 - a. Piping exposed through floors and walls in finished areas: Split plate, cast brass with polished chrome-plated finish with set screw. Deep escutcheons to be provided where standard depth will not fit.
 - b. Escutcheons shall cover entire hole penetration.
 - c. Escutcheon to be appropriately sized for pipe.
3. 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.

3.3 PIPE SLEEVE INSTALLATION REQUIREMENTS

- A. Pipe sleeves are required at all through wall and floor penetrations.
 1. Sleeves are to be of the following material:
 - a. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc-coated, with plain ends.
 2. Sleeves are required for all through floor and wall penetrations. Sleeves to be set and poured in place (in slab applications), secure all sleeves with fasteners.
 3. Sleeves to extend 2 inches past face of floor or wall. Pipe sleeve in finished areas to be flush with wall or floor for installation of escutcheon.
 4. Install sleeves in new partitions, slabs, and walls as they are built.
 5. For interior wall penetrations, seal annular space between sleeve and pipe or pipe insulation using joint sealants appropriate for size, depth, and location of joint. Comply with requirements in Section "Joint Sealants" for joint sealants.
 6. For exterior wall penetrations above grade, seal annular space between sleeve and pipe using joint sealants appropriate for size, depth, and location of joint. Comply with requirements in Section "Joint Sealants" for joint sealants.
 7. For exterior wall penetrations below grade, seal annular space between sleeve and pipe using sleeve seals specified in this Section.
 8. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation unless otherwise indicated. Seal annular space with water tight sealant. (equal to NP-1). All sleeves and penetrations to maintain rating of wall / floor. Seal pipe penetrations with fire-stopping materials.
 9. Install sleeve materials according to the following applications:
 - a. Sleeves for Piping Passing through Concrete Floor Slabs: galvanized steel pipe.
 - b. Sleeves for Piping Passing through Concrete Floor Slabs of Mechanical Equipment Areas or Other Wet Areas: Galvanized-steel pipe sleeves.
 - 1) Extend sleeves 2 inches above finished floor level.
 - 2) For pipes penetrating floors with membrane waterproofing, extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches (50 mm) above finished floor level. Comply with requirements in Section "Sheet Metal Flashing and Trim" for flashing.
 10. Sleeves for Piping Passing through Gypsum-Board Partitions:
 - a. Galvanized-steel pipe sleeves.

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- b. Exception: Sleeves are not required for water supply tubes and waste pipes for individual mechanical fixtures if escutcheons will cover openings.
- 11. Sleeves for Piping Passing through Concrete Roof Slabs: Reference details.
- 12. Sleeves for Piping Passing through Exterior Concrete Walls:
 - a. Galvanized-steel pipe sleeves.
 - b. Install sleeves that are large enough to provide 1-inch annular clear space between sleeve and pipe or pipe insulation when sleeve seals are used.
- 13. Sleeves for Piping Passing through Interior Concrete Walls:
 - a. Galvanized-steel pipe sleeves.
- 14. Mechanical sleeve seals
 - a. Install sleeve seals in sleeves in exterior concrete walls at water-service piping entries into building. Sleeves must be poured in place. Installation of sleeves after wall is constructed is not acceptable.
 - b. Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble sleeve seal components and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- B. 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.

3.4 DIELECTRIC FITTING INSTALLATION

- A. 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.
- B. 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.

3.5 EQUIPMENT INSTALLATION – COMMON REQUIREMENTS

- A. Install equipment 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.

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- E. Install equipment giving right of way to piping installed at required slope.

3.6 PAINTING AND FINISHING

- A. Apply paint to exposed piping according to the following, unless otherwise indicated:
 - 1. Interior, Ferrous Piping: Use semigloss, acrylic-enamel finish. Include finish coat over enamel undercoat and primer.
 - 2. Interior, Galvanized-Steel Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over galvanized metal primer.
 - 3. Interior, Ferrous Supports: Use semigloss, acrylic-enamel finish. Include finish coat over enamel undercoat and primer.
 - 4. Exterior, Ferrous Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over rust-inhibitive metal primer.
 - 5. Exterior, Galvanized-Steel Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over galvanized metal primer.
 - 6. Exterior, Ferrous Supports: Use semigloss, acrylic-enamel finish. Include two finish coats over rust-inhibitive metal primer.
- 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.

3.7 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."

3.8 ERECTION OF WOOD SUPPORTS AND ANCHORAGE

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorage to support and anchor mechanical materials and equipment (not to be used at pipe supports).
- B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
- C. Attach to substrates as required to support applied loads.

3.9 DEMOLITION

- 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.

3.10 CUTTING AND PATCHING

- A. Disconnect, demolish, and remove Work specified in Mechanical Sections.

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- B. If pipe, ductwork, insulation, or equipment to remain is damaged or disturbed, remove damaged portions and install new products of equal capacity and quality.
- C. Accessible Work: Remove indicated exposed pipe and ductwork in its entirety.
- D. Work Abandoned in Place: Cut and remove underground pipe a minimum of 2 inches beyond face of adjacent construction. Cap and patch surface to match existing finish.
- E. Removal: Remove indicated equipment from Project site.
- F. Temporary Disconnection: Remove, store, clean, reinstall, reconnect, and make operational equipment indicated for relocation.

3.11 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 230513

SECTION 230529

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following hangers and supports for plumbing system piping and equipment:
 - 1. Steel pipe hangers and supports.
 - 2. Trapeze pipe hangers.
 - 3. Metal framing systems.
 - 4. Thermal-hanger shield inserts.
 - 5. Fastener systems.
 - 6. Pipe positioning systems.
 - 7. Equipment supports.
- B. Related Sections include the following:
 - 1. Specification Section "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
 - 2. Specification Section "Metal Ducts" for duct hangers and supports.

1.3 DEFINITIONS

- A. MSS: Manufacturers Standardization Society for The Valve and Fittings Industry Inc.
- B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.4 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.5 SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel pipe hangers and supports.
 - 2. Thermal-hanger shield inserts.
 - 3. Powder-actuated fastener systems.
 - 4. Pipe positioning systems.

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- B. Shop Drawings: Show fabrication and installation details and include calculations for the following:
 - 1. Trapeze pipe hangers. Include Product Data for components.
 - 2. Metal framing systems. Include Product Data for components.
 - 3. Equipment supports.
- C. Welding certificates.

1.6 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."
- B. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code--Steel."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 METAL COATING REQUIREMENTS:

- A. All metal products shall have the following coatings:
 - 1. Wet/damp areas: hot dipped galvanized.
 - 2. Dry or conditioned areas: pre-galvanized.

2.3 STEEL PIPE HANGERS AND SUPPORTS

- A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.
- B. Manufacturers:
 - 1. AAA Technology & Specialties Co., Inc.
 - 2. Bergen-Power Pipe Supports.
 - 3. B-Line Systems, Inc.; a division of Cooper Industries.
 - 4. Carpenter & Paterson, Inc.
 - 5. Empire Industries, Inc.
 - 6. ERICO/Michigan Hanger Co.
 - 7. Globe Pipe Hanger Products, Inc.
 - 8. Grinnell Corp.
 - 9. GS Metals Corp.
 - 10. National Pipe Hanger Corporation.
 - 11. PHD Manufacturing, Inc.
 - 12. PHS Industries, Inc.

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- 13. Piping Technology & Products, Inc.
- 14. Tolco Inc.

- C. Galvanized, Metallic Coatings: Pre-galvanized (minimum thickness of 0.5 mils) or hot dipped (1.4 to 3.9 mil thickness).
- D. Nonmetallic Coatings: Plastic coating, jacket, or liner.
- E. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.4 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

2.5 METAL FRAMING SYSTEMS

- A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.
- B. Manufacturers:
 - 1. B-Line Systems, Inc.; a division of Cooper Industries.
 - 2. ERICO/Michigan Hanger Co.; ERISTRUT Div.
 - 3. GS Metals Corp.
 - 4. Power-Strut Div.; Tyco International, Ltd.
 - 5. Thomas & Betts Corporation.
 - 6. Tolco Inc.
 - 7. Unistrut Corp.; Tyco International, Ltd.
- C. Coatings: Manufacturer's standard finish unless bare metal surfaces are indicated.
- D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

2.6 THERMAL-HANGER SHIELD INSERTS

- A. Description: 100-psig minimum, compressive-strength insulation insert with a sheet metal shield.
- B. Manufacturers:
 - 1. Carpenter & Paterson, Inc.
 - 2. ERICO/Michigan Hanger Co.
 - 3. PHS Industries, Inc.
 - 4. Pipe Shields, Inc.
 - 5. Rilco Manufacturing Company, Inc.
 - 6. Buckaroos
- C. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with vapor barrier. **Wood inserts are not acceptable.**
- D. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass.

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- E. Insulation-Insert Material for Hot Piping only, up to 3" diameter: Molded fiberglass block, 20 lbs/ft³ density, thermal conductivity of 0.30.
- F. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- G. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- H. Insert Length: Extend 4 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.7 FASTENER SYSTEMS

- A. Mechanical-Expansion Anchors: Insert-wedge-type stainless steel, for use in hardened Portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
 - 1. Manufacturers:
 - a. B-Line Systems, Inc.; a division of Cooper Industries.
 - b. Empire Industries, Inc.
 - c. Hilti, Inc.
 - d. ITW Ramset/Red Head.
 - e. MKT Fastening, LLC.
 - f. Powers Fasteners.

2.8 PIPE POSITIONING SYSTEMS

- A. Description: IAPMO PS 42, system of metal brackets, clips, and straps for positioning piping in pipe spaces for plumbing fixtures for commercial applications.
- B. Manufacturers:
 - 1. C & S Mfg. Corp.
 - 2. HOLDRITE Corp.; Hubbard Enterprises.
 - 3. Samco Stamping, Inc.

2.9 EQUIPMENT SUPPORTS

- A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.

2.10 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars.
 - 1. Exterior: Galvanized steel.
 - 2. Interior: Black steel.
- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, non-shrink and nonmetallic grout; suitable for interior and exterior applications.
 - 1. Properties: Nonstaining, noncorrosive, and nongaseous.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

- A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use padded hangers for piping that is subject to scratching.
- F. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of non-insulated or insulated stationary pipes, NPS 1/2 to NPS 30.
 - 2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of 120 to 450 deg F pipes, NPS 4 to NPS 16, requiring up to 4 inches of insulation.
 - 3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes, NPS 3/4 to NPS 24, requiring clamp flexibility and up to 4 inches of insulation.
 - 4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes, NPS 1/2 to NPS 24, if little or no insulation is required.
 - 5. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
 - 6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated stationary pipes, NPS 3/4 to NPS 8.
 - 7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of non-insulated stationary pipes, NPS 1/2 to NPS 8.
 - 8. Adjustable Band Hangers (MSS Type 9): For suspension of non-insulated stationary pipes, NPS 1/2 to NPS 8.
 - 9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of non-insulated stationary pipes, NPS 1/2 to NPS 2.
 - 10. Split Pipe-Ring with or without Turnbuckle-Adjustment Hangers (MSS Type 11): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 8.
 - 11. Extension Hinged or 2-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 3.
 - 12. U-Bolts (MSS Type 24): For support of heavy pipes, NPS 1/2 to NPS 30.
 - 13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
 - 14. Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange.
 - 15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange and with U-bolt to retain pipe.
 - 16. Adjustable, Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes, NPS 2-1/2 to NPS 36, if vertical adjustment is required, with steel pipe base stanchion support and cast-iron floor flange.

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17. Single Pipe Rolls (MSS Type 41): For suspension of pipes, NPS 1 to NPS 30, from 2 rods if longitudinal movement caused by expansion and contraction might occur.
 18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes, NPS 2-1/2 to NPS 20, from single rod if horizontal movement caused by expansion and contraction might occur.
 19. Complete Pipe Rolls (MSS Type 44): For support of pipes, NPS 2 to NPS 42, if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
 20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes, NPS 2 to NPS 24, if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
 21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes, NPS 2 to NPS 30, if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.
- G. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system 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.
 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.
- H. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
 3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
 4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
 5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.
- I. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.
 3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
 6. C-Clamps (MSS Type 23): For structural shapes.
 7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
 8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
 9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
 10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
 11. Malleable Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.

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12. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:
 - a. Light (MSS Type 31): 750 lb.
 - b. Medium (MSS Type 32): 1500 lb.
 - c. Heavy (MSS Type 33): 3000 lb.
 13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
 14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
 15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.
- J. Saddles and Shields: Unless otherwise indicated and except as specified in piping system 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. Thermal-Hanger Shield Inserts: For supporting insulated cold pipe. **Wood inserts are not acceptable.**
- K. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system 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.
 3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41 roll hanger with springs.
 4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
 5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from hanger.
 6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from base support.
 7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from trapeze support.
 8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
 - a. Horizontal (MSS Type 54): Mounted horizontally.
 - b. Vertical (MSS Type 55): Mounted vertically.
 - c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.
- L. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.
- M. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.
- N. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

3.2 HANGER AND SUPPORT INSTALLATION

- A. Steel Pipe Hanger 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; **attaching to metal roof decks is not permissible.**
- B. Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated trapeze pipe hangers.
 - 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 D1.1.
- C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.
- D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- E. Fastener System Installation:
 - 1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
 - 2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- F. Pipe Positioning System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture. Refer to Specification Section "Plumbing Fixtures" for plumbing fixtures.
- G. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- H. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- I. Install hangers and supports to allow controlled thermal 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.
- J. Install lateral bracing with pipe hangers and supports to prevent swaying.
- K. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger 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.
- L. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- M. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9 (for building services piping) are not exceeded.

- N. 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 for building services piping.
 2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
 3. Install thermal-hanger shield inserts on insulated piping with vapor barrier. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
 4. 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.
 5. Insert Material: Length at least as long as protective shield.
 6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.
- O. Insulated Ducts (Mineral Fiber Blanket). Comply with the following:
1. At all unistrut supports provide mineral fiber board insert in between ductwork and unistrut. Insert to extend 12" on both sides of unistrut, full length of strut. Extend blanket between structural insert.

3.3 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make smooth bearing surface.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

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3.5 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.6 PAINTING

- A. Touch Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Touch Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09 painting Sections.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 230529

SECTION 230553

MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following mechanical identification materials and their installation:
 1. Equipment nameplates.
 2. Equipment markers.
 3. Equipment signs.
 4. Access panel and door markers.
 5. Pipe markers.
 6. Duct markers.
 7. Stencils.
 8. Valve tags.
 9. Valve schedules.
 10. Warning tags.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Valve Schedules: For each piping system. Furnish extra copies (in addition to mounted copies) to include in maintenance manuals. Reproduce on $8\frac{1}{2} \times 11$ bond. Tabulate valve number, piping system, system abbreviation as shown on tag, room or space location of valve, and variations for identification. Mark valves intended for emergency shutoff and similar special uses. Indicate normal operating positions (open, closed, modulating, or balance).

1.4 QUALITY ASSURANCE

- A. ASME Compliance: Comply with ASME A13.1, "Scheme for the Identification of Piping Systems," for letter size, length of color field, colors, and viewing angles of identification devices for piping.

1.5 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 GENERAL

- A. Products specified are for applications referenced in other Mechanical sections. In addition to a factory installed equivalent nameplate, all equipment shall have an engraved equipment sign that matches the schedule tag name.

2.2 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.
 - 4. Material: Brass.
- B. Equipment Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.
 - 1. Data: Instructions for operation of equipment and for safety procedures.
 - 2. Engraving: Manufacturer's standard letter style, of sizes and with terms to match equipment identification.
 - 3. Thickness: 1/8 inch, unless otherwise indicated.
 - 4. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.

2.3 PIPING IDENTIFICATION DEVICES

- A. Manufactured Pipe Markers, General: Manufacturers standard preprinted, semi-rigid, snap-on type.
 - 1. Colors: Comply with ASME A13.1, unless otherwise indicated.
 - 2. Pipes with OD, Including Insulation, Less Than 6 Inches: Full-band pipe markers extending 360 degrees around pipe at each location.
 - 3. Pipes with OD, Including Insulation, 6 Inches and Larger: Either full-band or strip-type pipe markers at least three times letter height and of length required for label.
 - 4. Arrows: Integral with piping system service lettering to accommodate both directions; or as separate unit on each pipe marker to indicate direction of flow.
 - 5. Lettering: Manufacturers standard preprinted.

2.4 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. See Execution section for color scheme.

2.5 VALVE TAGS

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- A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch sequenced numbers. Provide 5/32-inch hole for fastener.
 - 1. Material: 0.032-inch thick aluminum.
 - 2. Valve-Tag Fasteners: Brass S-hook.
 - 3. Size: 1½ inches in diameter, unless otherwise indicated.

2.6 VALVE SCHEDULES

- A. Valve-Schedule Frames: Glazed display frame for removable mounting on masonry walls for each page of valve schedule. Include mounting screws.
- B. Frame: Extruded aluminum.
- C. Glazing: ASTM C 1036, Type I, Class 1, Glazing Quality B, 2.5-mm, single-thickness glass.

2.7 WARNING TAGS

- A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags; of plasticized card stock with matte finish suitable for writing.
 - 1. Size: 3 by 5-1/4 inches **minimum**.
 - 2. Fasteners: Brass grommet and wire.
 - 3. Nomenclature: Large-size primary caption such as DANGER, CAUTION, or DO NOT OPERATE.
 - 4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.1 APPLICATIONS, GENERAL

- A. Products specified are for applications referenced in other Mechanical Sections. 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. Fuel-burning units, including boilers, furnaces, heaters, stills, and absorption units.
 - 2. Pumps, compressors, chillers, condensers, and similar motor-driven units.
 - 3. Heat exchangers, coils, evaporators, cooling towers, heat recovery units, and similar equipment.
 - 4. Fans, blowers, primary balancing dampers, and mixing boxes.
 - 5. 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.

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1. Letter Size: Minimum 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, 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. Fuel-burning units, including boilers, furnaces, heaters, stills, and absorption units.
 - e. Pumps, compressors, chillers, condensers, and similar motor-driven units.
 - f. Heat exchangers, coils, evaporators, cooling towers, heat recovery units, and similar equipment.
 - g. Fans, blowers, primary balancing dampers, and mixing boxes.
 - h. Packaged HVAC central-station and zone-type units.
 - i. Tanks and pressure vessels.
 - j. 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. Green and Yellow, Orange: For combination cooling and heating equipment and components.
 - d. Brown: For energy-reclamation equipment and components.
 2. Letter Size: Minimum 1/2 inch for name of units if viewing distance is less than 24 inches, 3/4 inch for viewing distances up to 72 inches, 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 and hazardous units such as gas outlets.
 - b. Fuel-burning units, including boilers, furnaces, heaters, stills, and absorption units.
 - c. Pumps, compressors, chillers, condensers, and similar motor-driven units.
 - d. Heat exchangers, coils, evaporators, cooling towers, heat recovery units, and similar equipment.
 - e. Fans, blowers, primary balancing dampers, and mixing boxes.
 - f. Packaged HVAC central-station and zone-type units.
 - g. Tanks and pressure vessels.
 - h. 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: Snap-on application of pretensioned, semi-rigid plastic pipe marker.
 - 2. Pipes with OD, Including Insulation, 6 Inches and Larger: Shaped pipe markers. Use size to match pipe and secure with manufacturer's stainless steel bands.
 - 3. Fasten Option: Laminated or bonded application of pipe marker to pipe or insulation.
- B. Locate pipe markers and color bands where piping is exposed in finished spaces; in machine rooms; in accessible maintenance spaces such as shafts, tunnels and plenums; and in exterior nonconcealed locations such as rooftops and chiller yards, 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 along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
 - 7. On piping above removable acoustical ceilings.

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. Yellow: For hot-air supply ducts.
 - 3. Blue: For exhaust-, outside-, relief-, return-, and mixed-air ducts.
 - 4. ASME A13.1 Colors and Designs: For hazardous material exhaust.
 - 5. Letter Size: Minimum 1/2 inch for name of units if viewing distance is less than 24 inches, 3/4 inch for viewing distances up to 72 inches, 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 in each space where ducts are exposed or concealed by removable ceiling system. Reduce intervals to 25 feet in areas of high duct congestion.

3.5 VALVE-SCHEDULE INSTALLATION

- A. Mount valve schedule on wall in accessible location in each major equipment room.

3.6 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

3.7 VALVE TAGS

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- A. Install on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, plumbing fixture supply stops, shutoff valves, and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in valve schedule.
- B. Valve Tag Application Schedule: Tag valves according to size, shape, color scheme, and with captions similar to those indicated in the following:
- C. Tag Material: Aluminum.
- D. Tag Size and Shape: 1-1/2 inches, round.
- E. Tag Color: According to the following:
 - 1. Chilled Water: Blue.
 - 2. Cold Water: Black.
 - 3. Hot Water: Red.
 - 4. Fire Protection: Red.
 - 5. Sprinkler: White.
 - 6. Gas: Yellow.
 - 7. Steam: Red.
- F. Letter Color: White.
- G. Install mounted valve schedule in each major equipment room.

3.8 EQUIPMENT SIGNS AND MARKERS

- A. Install engraved plastic-laminate signs or equipment markers on or near each major item of mechanical equipment. Include signs for the following general categories of equipment:
 - 1. Main control and operating valves, including safety devices and hazardous units such as gas outlets.
 - 2. Meters, gages, thermometers, and similar units.
 - 3. Fuel-burning units, including boilers, furnaces, heaters, stills, and absorption units.
 - 4. Pumps, compressors, chillers, condensers, and similar motor-driven units.
 - 5. Heat exchangers, coils, evaporators, cooling towers, heat recovery units, and similar equipment.
 - 6. Fans, blowers, primary balancing dampers, and mixing boxes.
 - 7. Packaged HVAC central-station and zone-type units.
 - 8. Tanks and pressure vessels.
 - 9. Strainers, filters, humidifiers, water-treatment systems, and similar equipment.
 - 10. Any concealed appurtenances requiring access for maintenance shall be clearly identified by sign (to include but not be limited to unions, strainers, valves, etc.).
- B. Duct Systems: Identify air supply, return, exhaust, intake, and relief ducts with duct markers; or provide stenciled signs and arrows showing service and direction of flow.
 - 1. Location: Locate signs near points where ducts enter into concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

3.9 ADJUSTING AND CLEANING

- A. Relocate mechanical identification materials and devices that have become visually blocked by work of this or other Divisions.

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- B. Clean faces of identification devices and glass frames of valve charts.

END OF SECTION 230553

SECTION 238239

UNIT HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes propeller unit heaters with **electric-resistance** coils.

1.3 SUBMITTALS

- A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each unit type and configuration.
- B. Shop Drawings: Submit the following for each unit type and configuration:
 - 1. Plans, elevations, sections, and details.
 - 2. Details of anchorages and attachments to structure and to supported equipment.
 - 3. Wiring Diagrams: Power, signal, and control wiring.
 - 4. Equipment schedules to include rated capacities, operating characteristics, furnished specialties, and accessories.
- C. Coordination Drawings: Plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - 1. Suspended ceiling components.
 - 2. Structural members to which unit heaters will be attached.
 - 3. Other items, including the following:
 - a. Lighting fixtures.
 - b. Sprinklers.
- D. Field quality-control test reports.
- E. Operation and Maintenance Data: For propeller unit heaters to include in emergency, operation, and maintenance manuals.

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.

PART 2 - PRODUCTS

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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. Markel.
 - 2. Modine.
 - 3. Reddi.
 - 4. Reznor
 - 5. Sterling.

2.2 UNIT HEATERS

- A. Description: An assembly including casing, coil, fan, and motor in horizontal discharge configuration with adjustable discharge louvers.
- B. Comply with UL 2021.
- C. Comply with UL 823.

2.3 CASING

- A. Cabinet: Removable panels for maintenance access to controls.
- B. Cabinet Finish: Manufacturer's **standard** baked enamel applied to factory-assembled and -tested propeller unit heater before shipping.
- C. Discharge Louver: Adjustable fin diffuser for horizontal units and conical diffuser for vertical units.

2.4 ELECTRIC-RESISTANCE HEATING ELEMENTS

- A. Nickel-chromium heating wire, free from expansion noise and 60-Hz hum, embedded in magnesium oxide refractory and sealed in steel or corrosion-resistant metallic sheath with fins no closer than 0.16 inch. Element ends shall be enclosed in terminal box. Fin surface temperature shall not exceed 550 deg F at any point during normal operation.
 - 1. Circuit Protection: One-time fuses in terminal box for overcurrent protection and limit controls for high-temperature protection of heaters.
 - 2. Wiring Terminations: Stainless-steel or corrosion-resistant material.

2.5 FAN

- A. Propeller type, aluminum wheel directly mounted on motor shaft in the fan venturi.

2.6 FAN MOTORS

- A. Motor Type: Permanently lubricated, open drip proof.

2.7 CONTROLS

- A. Control Devices:
 - 1. **Unit-mounted** thermostat unless specified differently on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive propeller unit heaters for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in for piping and electrical connections to verify actual locations before propeller unit-heater installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install propeller unit heaters level and plumb.
- B. Install propeller unit heaters to comply with NFPA 90A.
- C. Suspend propeller unit heaters from structure with all-thread hanger rods and **elastomeric hangers**. Hanger rods and attachments to structure are specified in Specification Section "Hangers and Supports."
- D. Install wall-mounting thermostats and switch controls in electrical outlet boxes at heights to match lighting controls.

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Mechanical Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to machine to allow service and maintenance.
- C. Ground equipment according to Specification Section "Grounding and Bonding."
- D. Connect wiring according to Specification Section "Conductors and Cables."

3.4 FIELD QUALITY CONTROL

- A. Testing: Perform the following field quality-control testing and report results in writing:
 - 1. After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 2. Operate electric heating elements through each stage to verify proper operation and electrical connections.
 - 3. Test and adjust controls and safeties.
- B. Remove and replace malfunctioning units and retest as specified above.

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3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain propeller unit heaters. Refer to Section "Demonstration and Training."

END OF SECTION 238239

SECTION 260005
ELECTRICAL DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
1. Demolition and removal of selected portions of building or structure.
 2. Demolition and removal of selected site elements.
 3. Salvage of existing items to be reused or recycled.
- B. Related Sections include the following:
1. Division 1 Section "Summary" for use of premises, phasing, and Owner-occupancy requirements.
 2. Division 1 Section "Photographic Documentation" for preconstruction photographs taken before selective demolition operations.
 3. Division 1 Section "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.
 4. Division 1 Section "Construction Waste Management" for disposal of demolished materials.
 5. Division 1 Section "Cutting and Patching" for cutting and patching procedures.
 6. Division 2 Section "Building Demolition" for demolition of entire buildings, structures, and site improvements.
 7. Division 2 Section "Site Clearing" for site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

- A. Remove or Demolish: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Detach items from existing construction and deliver them to Owner cleaned, packaged, and ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

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- A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.
 - 1. Coordinate with Owner's representative, who will establish special procedures for removal and salvage.

1.5 SUBMITTALS

- A. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shut-off, capping, and continuation of utility services.
 - 4. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
 - 5. Means of protection for items to remain and items in path of waste removal from building.
- B. Inventory: After selective demolition is complete, submit a list of items that have been salvaged.
- C. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.
 - 1. Comply with submittal requirements in Division 1 Section "Construction Waste Management."
 - 2. Dispose of ballasts and lamps in accordance with current EPA Standards.

1.6 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI A10.6 and NFPA 241.
- C. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to selective demolition including, but not limited to, the following:
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 5. Review areas where existing construction is to remain and requires protection.

1.7 PROJECT CONDITIONS

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- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is unknown whether hazardous materials will be encountered in the Work.
 - 1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Owner will remove hazardous materials under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 WARRANTY

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. Trace circuits feeding existing to-remain portions of the building. Do not demolish circuits in these areas. If circuits are in both "to remain" and "to be removed" areas, demolish back to nearest to-remain J-Box.

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- F. Provide to the Engineer a diagram and index of circuits traced in the “to remain” areas.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.
 - 1. Comply with requirements for existing services/systems interruptions specified in Division 1 Section “Summary.”
- B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Arrange to shut off indicated utilities with utility companies.
 - 2. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
 - a. Where entire wall is to be removed, existing services/systems may be removed with removal of the wall.

3.3 PREPARATION

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

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - 2. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 - 3. Maintain adequate ventilation when using cutting torches.
 - 4. Dispose of demolished items and materials promptly.
- B. Removed and Salvaged items:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to Owner’s storage area designated by Owner.
 - 5. Protect items from damage during transport and storage.

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

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

3.5 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA- approved landfill.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

- B. Burning: Do not burn demolished materials.

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

END OF SECTION 260005

SECTION 260015

GENERAL CONDITIONS FOR ALL ELECTRICAL WORK

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including Conditions of the Contract (General and Supplementary Conditions) and Division 1 specification sections, apply to work of this section.
- B. The requirements of this section apply to all sections of electrical, signal, and life safety, and all sections that are installed by the electrical contractor to include electrical work done under the mechanical contractor.

1.2 DESCRIPTION OF WORK

- A. This section covers the general provisions of the electrical specifications applicable to the following systems:
 - 1. Electrical power and lighting to include generators, UPS Systems, and passive electrical generating equipment (solar).
 - 2. All Special Systems (fire alarm, security, telephone, data, television, and annunciators associated with power).
 - 3. Control wiring associated with electrical or mechanical equipment.
- B. The use of the word “electrical” in any specification contained within the electrical, signal, or life safety division sections shall include all aspects of each systems complete install. This shall be extended to mechanical or plumbing signal systems.
- C. The use of the work “life safety” shall refer to all fire alarm, fire protection, and mass notification systems installed by the electrical contractor.
- D. The use of the word “mechanical” shall refer to both mechanical and plumbing.
- E. The use of the word “pipe” shall refer to all electrical raceway.

1.3 DRAWINGS

- A. These specifications are accompanied by drawings of the building and details of the installations showing the locations of equipment, lighting, panels, etc. The drawings and these specifications are complementary to each other, and what is called for by one shall be as binding as if called for by both.
- B. Drawings and specification conflicts shall be identified as early as possible to ensure conflict resolution prior to installation. The contractor shall not install any equipment with known conflicts or pending information requests. The contractor shall contact the Engineer of Record or their representative for information clarification prior to installing any item that is in question. The contractor shall not install any equipment that is not consistent with the manufacturers approved installation instructions unless directed by the engineer.

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- C. In all cases all installations shall be at least in accordance with all the approved codes and their local amendments. The drawings and specifications may exceed local code allowances and the most stringent applies. The existence or allowance of a practice or product by code does not supersede requirements of the drawings and specifications. In other words, just because it is allowed by code does not mean that it is allowed on this project.
- D. If any departures from the drawings are deemed necessary by the Contractor, details of such departures and the reasons therefore shall be submitted to the Owner's Representative for approval. No departures shall be made without prior written approval by the Owner's Representative.
- E. There are intricacies of construction which are impractical to specify or indicate in detail; however, in such cases, the current rules of good practice and applicable specifications shall govern. In all cases the requirements specified in the NEC and local jurisdiction shall be followed.
- F. It is the Contractor's responsibility to properly use all information found on the Architectural, Structural, Mechanical, and Electrical drawings and applicable shop drawings where such information affects his work. The contractor shall review the entire construction document set both prior to bid and construction.
- G. All dimensional information related to new structures shall be taken from the appropriate drawings. All dimensional information relative to existing facilities shall be taken from actual measurements made by the Contractor on the site.
- H. Any duplicate circuiting listed on the drawings shall be bid as multiple circuits with the intention of the next available circuit and breaker to be used. The contractor shall bring this to the attention of the engineer for clarification and updating the drawings. The new circuit numbers shall be annotated on both the panel schedules and the record drawings. The contractor is not required to follow the exact circuit numbers on the panel schedules (balancing phases, wiring convenience, or conduit routing installation), however, the contractor is responsible for keeping the panel schedules accurate and up to date in addition to ensuring the circuit numbers are identified correctly.
- I. Any installation that is not in compliance with these requirements shall be corrected at the contractors cost and responsibility.

1.4 BIDDING

- A. The contractor is responsible for bidding complete and working systems. In the event that some part of the system is not included in the construction document or the specifications and it is a necessary part of the system to work properly, the contractor shall include that work as part of the bid amount. This includes, but not limited to:
 - 1. Power for equipment shown on the drawings. Examples include, but are not limited to:
 - a. Equipment Panels
 - b. Controllers
 - c. Electronic Devices
 - d. Mechanical Equipment
 - e. Plumbing Equipment
 - 2. Cabling to communicate with the head end equipment. Examples include, but are not limited to:

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- a. Generator to Annunciator
 - b. Generator and ATS
 - c. Security
 - d. Access Control
 - e. Switching
 - f. Equipment starters and the switching locations
 - g. Monitoring equipment
- B. The contractor is not responsible for interpreting additional accessory options that are not included in the drawings or specifications or equipment that is not shown or indicated as part of the entire contract documents or specifications.
- C. The contractor shall review the entire set of specifications and contract documents for all equipment and connections requiring electrical work.
- D. Equipment Substitutions or Proposed Equivalents:
1. Contractor shall submit proposed substitutions or equivalents to the Architect or engineer during the bidding process prior to any final dates for questions as indicated on the bid forms or RFP's and provide a reasonable time to complete to comparison. All changes to the documents indicated a deviation from the specifications or drawings shall be part of the addenda process or written notification from the engineer of record, architect, owner, or a designated representative. Reasonable time for review is minimum one working week. The contractor shall retain the written notification of approval (if not published in an addenda) for purposes of future verification.
 2. The contractor is responsible for providing full comparison information for the products to be substituted. Incomplete information is subject to immediate rejection.
 3. Bids taken for equipment that is not approved is under the contractors own risk. Should the equipment be rejected under the post bid submittal process, the contractor is responsible for providing the specified equipment at no cost to the owner.
 4. Under no circumstances should the contractor accept bids for non-specified equipment from vendors who do not have prior approval or "speculate" that it will be approved. This is subject to immediate rejection and the specified equipment shall be required to be installed.
 5. No response from the architect, owner, or engineer shall not be considered an approval.

1.5 CONSTRUCTION REQUIREMENTS

- A. The architectural, structural, and electrical plans and specifications and other pertinent documents issued by the Architect are a part of these specifications and the accompanying electrical drawings, and shall be complied with in every respect. All the above is included in the Contract Documents, and shall be examined by all bidders. Failure to comply shall not relieve the Contractor of responsibility or be used as a basis for additional compensation because architectural, structural, or mechanical details were not included in the electrical drawings.
- B. It is the intent of the Contract Documents to provide an installation complete in every respect. In the event that additional details or special construction may be required for work indicated or specified in this section or work specified in other sections, it shall be the responsibility of the Contractor to provide same as well as to provide material and equipment usually furnished with such systems or required to complete the installation, whether mentioned or not.

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- C. The Contractor shall be responsible for fitting his material and apparatus into the building and shall carefully lay out his work at the site to conform to the structural conditions, to avoid all obstructions, to comply with Codes, to facilitate the work of other trades, to conform to the details of the installation supplied by the manufacturer of the equipment to be installed, and thereby to provide an integrated satisfactory operating installation.
- D. The mechanical, electrical, and associated drawings are necessarily diagrammatic in character and do not show every connection in detail or every pipe or conduit in its exact location. These details are subject to the requirements of ordinances and also structural and architectural conditions. It shall be the contractor's responsibility to coordinate with other disciplines to facilitate their equipment installation.
- E. The Contractor shall carefully investigate structural and finish conditions and shall coordinate the separate trades in order to avoid interference between the various phases of work. Work shall be laid out so that it will be concealed in furred chases and above suspended ceilings, etc. in finished portions of the building, unless specifically noted to be exposed. Work shall be installed to avoid crippling of structural members; therefore, inserts to accommodate hangers shall be set before concrete is poured, and proper openings through floor, walls, beams, etc. shall be provided as hereinafter specified or as otherwise indicated or required. All work shall be installed parallel or perpendicular to the lines of the building unless otherwise noted.
- F. Conduit and equipment are generally intended to be installed true and square to the building construction, and located as high as possible against the structure in a neat and workmanlike manner. The plans do not show all required offsets, elbows, and other location details. Work shall be concealed in all finished areas. Conduit is intended to be installed with factory fittings or bent in a professional, workmanlike manner.
- G. All parts of equipment requiring adjustment shall be easily accessible. Equipment shall be so located and installed as to permit convenient and safe maintenance and future replacement. The trade furnishing the equipment shall be responsible for notifying the Contractor, who shall notify the Owner's Representative prior to ordering same in the event that equipment specified and/or proposed is incompatible with this requirement.
- H. Location of Lighting and Outlets in Rooms:
 - 1. All lighting, plumbing, acoustical tile, modular lighting outlets, diffusers, sprinkler heads, grilles, registers, and other devices shall be referenced to coordinated, established data points and shall be located to present symmetrical arrangements with these points and to facilitate the proper arrangements of acoustical tile panels and other similar panels with respect to the mechanical outlets and electrical lighting and devices. Those mechanical and electrical outlets shall be referenced to such features as wall and ceiling furring's, balanced border widths, masonry joints, etc. Outlets in acoustical tile shall occur symmetrically in tile joints or in the centers of whole tiles. The final determination of the exact location of each outlet and the arrangements to be followed shall be acceptable to the Owner's Representative.
 - 2. The drawings show diagrammatically the locations of the various outlets and apparatus. Exact locations of these outlets and apparatus shall be determined by reference to the general plans and to all detail drawings, equipment drawings, roughing-in drawings, etc. by measurements at the building, and in cooperation with the other trades. The Owner reserves the right to make any reasonable change in location of any outlet or apparatus before installation, without additional cost to the

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Owner or the Architect. Contractor shall coordinate work with architectural reflective ceiling plan.

- I. The Contractor, by submitting a bid on this work, sets forth that he has the necessary technical training and ability, and that he will install his work in a satisfactory and workmanlike manner which is up to the best standards of the trade, complete and in good working order. If any of the requirements of the plans and specifications are impossible of performance, or if the installation when made in accordance with such requirements will not perform satisfactorily, he shall report same to the Owner's Representative for correction promptly after discovery of the discrepancy.
- J. No extra compensation will be allowed for extra work or change caused by failure to comply with the above requirements.

1.6 JOB CONDITIONS

- A. Submittal of bid implies bidder has read paragraphs of the specifications and will be bound by their conditions.
- B. Contractor Qualifications: A minimum of five years' experience installing commercial electrical power lighting and special systems, similar to those described in these specifications, and make available at the owner or engineer's request a list of five previous projects including name of project and contact person names and phone numbers as a separate document in addition to the bid or proposal submitted.
- C. Contractor must be licensed and hold a current contracting license that has been valid for a minimum of five years in the local State.
- D. Contractor must be able to bond work for performance of work being bid and provide a written statement from the bonding agency proposed to be used for this project as a separate document in addition to the bid or proposal submitted. The bonding agency proposed to be used shall have a Best's insurance rating of A or A+.

1.7 INSPECTION OF THE SITE

- A. The Contractor shall visit the site, verifying all existing items indicated on drawings and/or specified, and familiarize himself with the existing work conditions, hazards, grades, actual formations, soil conditions, structures, utilities, equipment, systems, facilities, and local requirements. The submission of bids shall be deemed evidence of such visits. All proposals shall take these existing conditions into consideration, and the lack of specific information shall not relieve the Contractor of any responsibility.

1.8 PERMITS, UTILITY CONNECTIONS, AND INSPECTIONS

- A. Fees and Costs: The contractor shall obtain and pay for all permits, utility connections, utility extensions, and/or relocations and pay all costs required by the utility, including inspection fees, for all work included therein.
- B. Compliance: The Contractor shall comply in every respect with all requirements of local inspection departments, Board of Fire Underwriters, local ordinances and codes, and utility company requirements. In no case does this relieve the Contractor of the responsibility of

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complying with these specifications and drawings where specified conditions are of a higher quality than the requirements of the above-specified offices. Where requirements of the specifications and drawings are below the requirements of the above offices having jurisdiction, the Contractor shall make installations in compliance with the requirements of the above offices.

- C. Utilities: The Contractor shall check with the various utility companies involved in this project and shall provide complete in all respects the required utility relocations, extensions, modifications, and/or changes. Contractor shall verify the location of all existing utilities with the applicable Utility Company. The Contractor shall be responsible for all damages to existing utilities caused by his construction work, whether indicated on drawings or not, and repair all damage to existing utilities as acceptable to the Utility Company concerned.
- D. Utility Services:
 - 1. Power for the building service shall be obtained from local utility service. Contractor shall coordinate with the local utility for shutdowns and transformer installations. Contractor shall coordinate underground feeders with other underground piping and mark his conduit clearly. Contractor shall install feeders to the building transformer in accordance with
 - 2. Contractor shall coordinate meter location and provide access in accordance with local utility requirements.
 - 3. Transformer and ductbank rough-ins shall be in accordance with Utility provider requirements.
- E. Contractor Temporary Power: The contractor shall obtain temporary power in their name, from the local utility for the construction trailer and any equipment needed to perform his work. The contractor shall be responsible for the installation and removal of the temporary service at the conclusion of the project.
- F. Certification: Prior to final acceptance, the Contractor shall furnish a certificate of acceptance from the inspection departments having jurisdiction over the work for any and all work installed under this Contract. Any additional labor costs incurred as a result of a substitution shall be the Contractor's responsibility.

1.9 EXISTING FACILITIES

- A. The Contractor shall be responsible for loss or damage to the existing facilities caused by him and his workmen, and shall be responsible for repairing or replacing such loss or damage. The Contractor shall send proper notices, make necessary arrangements, and perform other services required for the care, protection, and in-service maintenance of all electrical and special systems for the new and existing facilities. The Contractor shall erect temporary barricades, with necessary safety devices, as required to protect personnel from injury, removing all such temporary protection upon completion of the work. Barricades shall clearly indicate with signage that which they are protecting. Contractor shall observe all OSHA rules.
- B. The Contractor shall provide temporary or new services to all existing facilities as required to maintain their proper operation when normal services are disrupted as a result of the work being accomplished under this project.
- C. Where existing construction is removed to provide working and extension access to existing utilities, Contractor shall remove doors, piping, conduit, outlet boxes, wiring, light fixtures, and

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equipment, etc. to provide this access and shall reinstall same upon completion of work in the areas affected.

- D. Where partitions, walls, floors, or ceilings of existing construction are indicated to be removed, all Contractors shall remove and reinstall in locations approved by the Architect/Engineer all devices required for the operation of the various systems installed in the existing construction. This is to include but is not limited to temperature controls system devices, electrical switches, relays, fixtures, piping, conduit, etc.
- E. Outages of services as required by the new installation will be permitted but only at a time approved by the Owner. The Contractor shall allow the Owner two weeks in order to schedule required outages. The time allowed for outages will not be during normal working hours unless otherwise approved by the Owner. All costs of outages, including overtime charges, shall be included in the contract amount. Unless otherwise scheduled by the Owner, planned shutdowns of the existing facilities shall occur between 6 p.m. Friday through 5 am Monday. The existing building shall be ready for morning start-up by 5 am Monday.

1.10 DEMOLITION AND RELOCATION

- A. The Contractor shall modify, remove, and/or relocate all materials and items so indicated on the drawings or required by the installation of new facilities. All removals and/or dismantling shall be conducted in a manner as to produce maximum salvage. Salvage materials shall remain the property of the Owner, and shall be delivered to such destination or otherwise disposed of as directed by the Owner. Materials and/or items scheduled for relocation and which are damaged during dismantling or reassembly operations shall be repaired and restored to good operative condition. The Contractor may, at his discretion, and upon the approval of the Owner, substitute new materials and/or items of like design and quality in lieu of materials and/or items to be relocated.
- B. All items which are to be relocated shall be carefully removed in reverse to original assembly or placement and protected until relocated. The Contractor shall clean and repair and provide all new materials, fittings, and appurtenances required to complete the relocations and to restore to good operative order. All relocations shall be performed by workmen skilled in the work and in accordance with standard practice of the trades involved.
- C. When items scheduled for relocation and/or reuse are found to be in damaged condition before work has been started on dismantling, the Contractor shall call the attention of the Owner to such items and receive further instructions before removal. Items damaged in repositioning operations are the Contractor's responsibility and shall be repaired or replaced by the Contractor as approved by the Owner, at no additional cost to the Owner.
- D. Service lines and wiring to items to be removed, salvaged, or relocated shall be removed to points indicated on the drawings, specified, or acceptable to the Owner. Service lines and wiring not scheduled for reuse shall be removed to the points at which reuse is to be continued or service is to remain. Such services shall be sealed, capped, or otherwise tied off or disconnected in a safe manner acceptable to the Owner. All disconnections or connections into the existing facilities shall be done in such a manner as to result in minimum interruption of services to adjacent occupied areas. Services to existing areas or facilities which must remain in operation during the construction period shall not be interrupted without prior specific approval of the Owner as hereinbefore specified.

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1.11 SUBMITTAL DATA

- A. General: As soon as practical and within 30 days after the date of award of contract and before purchasing or starting installation of any materials or equipment, the Contractor prepare or cause to be prepared shop drawings, product data, materials and equipment lists, diagrams, data, samples, and other submittals as required by the contract documents, hereinafter referred to as "Submittal Data." The Contractor shall review and approve all submittal data for compliance with the contract documents, manufacturer's recommendations, adequacy, clearances, code compliance, safety, and coordination with associated work.
- B. The Contractor shall submit approved submittal data to the Owner's Representative for review and comment as to general conformance with the design concept and general compliance with information given in the contract documents. Owner's Representative's review shall not include review of quantities, dimensions, weights or gauges, fabrication processes, construction methods, coordination with other trades or work, or construction safety and precautions, all of which are the sole responsibility of the Contractor. The reviewers shall make every effort to "catch" discrepancies and identify these to the contractor prior to ordering equipment. However, it shall remain the contractor's responsibility to order and install the equipment as listed in the drawings and specifications. At the owner's representative's discretion a detailed submittal may be required.
- C. Substitutions shall be clearly identified as such in the submittal by a cover sheet indicating that items are different from what is specified or scheduled. It shall be the contractor responsibility to provide complete substitution information so an accurate comparison can be made.
- D. Detail Submittals: Materials and equipment requiring detailed submittal data shall be submitted with sufficient data to indicate that all requirements of the specifications have been met and samples shall be furnished when requested. All manufacturer's data used as part of the submittal shall have all non-applicable features crossed out or deleted in a manner that will clearly indicate exactly what is to be furnished. The detailed submittals shall be accompanied by the same number of sets of pictorial and descriptive data derived from the manufacturer's catalogs and sales literature, or incorporated in the shop drawings. The Contractor may provide a detailed submittal on any item even though not required by the Owner's Representative.
- E. The Engineer's review of Shop Drawings and Brochures shall not relieve the Contractor of the responsibility for dimensions, errors that may be contained therein, or deviations from Contract Document requirements. It shall be clearly understood that the Engineer's noting some errors but overlooking others does not grant the Contractor permission to proceed in error. Regardless of any information contained in the Shop Drawings, the requirements of the Contract Documents shall govern and are not waived or superseded in any way by the submittal data review.
- F. The Contractor shall clearly and specifically identify and call to the attention of the Owner's Representative any deviation from the contract documents for which Owner acceptance is desired. The responsibility for such a deviation accepted by the Owner shall remain with the Contractor.
- G. Timeliness: The burden of timeliness in the complete cycle of submittal data is on the Contractor. The Contractor shall allow a minimum of four (4) weeks' time frame for the

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submittal cycle of each submission by the Owner's Representative. The Contractor is responsible for allowing sufficient time in the construction schedule to cover the aforementioned cycles of data processing, including time for all re-submission cycles on non-conforming materials, equipment, etc. covered by the data submitted. Construction delays and/or lack of timeliness in the above regard are the responsibility of the Contractor and will not justify any request for scheduled construction time extensions or extra compensation.

- H. Work performed in accordance with approved submittal data that is not in accordance with the Contract Documents and did not have the specific acceptance of the Owner's Representative shall be replaced at Contractor's cost.
- I. Submittals shall be provided in the following format:
1. The submittal brochures shall be in pdf format. The first page shall be titled "ELECTRICAL SUBMITTAL INFORMATION" and shall list the name and location of project, the Owner, the Engineer(s), the General Contractor, and the Subcontractors installing equipment represented in the brochure.
 2. A table of contents will follow the first page and shall list all of the sections contained in the specifications manual. Each section will be tabbed and will include its' respective brochures. All brochures will be three-hole punched and folded (if required). Each submittal section will correspond to the appropriate specification section number.
 3. Provide submittal data for all materials to be used on this project as indicated in each specifications manual section.
 4. Brochures submitted shall contain only information which is relevant to the particular equipment or materials to be furnished. Do not submit catalogs that describe several different items other than those items to be used unless all irrelevant information is marked out or relevant information is clearly marked.
 5. Brochures: Brochures submitted to the Engineer shall be published by the Manufacturers and shall contain complete and detailed engineering and dimensional information to show that the equipment will fit into the allotted space.
 6. Any submittal that is disapproved must be resubmitted within two (2) weeks following notification of such disapproval. If no satisfactory material is submitted within the two-week period, the Engineer reserves the right to require the Contractor to furnish items exactly as described in the Contract Documents.
 7. Unless a greater number is indicated within Division 1 of these specifications, submit six (6) copies of all submittal materials for review.
 8. No allowances will be made for submittals which are not made in a timely fashion or which are turned down because they do not meet the specifications. Should delivery problems arise due to the above, affecting the completion time of the project, the Contractor will furnish and install acceptable alternates until the proper materials arrive and then replace the alternate materials with the approved materials, all at no cost to the Owner, Architect, or Engineer. If the Contractor is not able to furnish an acceptable alternate until the proper materials arrive, he will assume all costs for furnishing and installing all alternates as directed by the Engineer.
 9. Submittal shall have the certification information as listed hereafter.
 10. Shop Drawings:
 - a. All shop drawings shall have the certification as listed hereafter.
 - b. Each Shop Drawing shall indicate in the lower right hand corner and each Brochure shall indicate on the front cover the following: Title of the Sheet or Brochure; name and location of the building; names of the Engineer, Contractor, Manufacturer, Supplier, Vendor, etc., the date of submittal; and the date of each correction and revision. So far as is practical, each Shop Drawing and/or Brochure shall bear a cross-reference note to the sheet number or numbers of

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the Contract Drawings and Specifications showing the same work. Shop Drawings shall be prepared as follows:

- 1) Shop Drawings: Drawings shall be newly prepared and not reproduced from the Contract Documents, drawn to a scale that can be easily read and shall contain sufficient plans, elevations, sections, and isometrics to describe clearly the items in question. Drawings shall be prepared by a draftsman skilled in this type of work. All equipment layouts and similar Shop Drawings shall be drawn to at least 1/8-inch = 1'-0" scale.
 - 2) All Shop Drawings shall indicate the equipment actually purchased. The elevation, location, support points, load imposed on the structure at support and anchor points, shall be indicated. All beam penetrations and slab penetrations shall be indicated and sized and shall be coordinated. All Design Drawing space allocations shall be maintained, such as ceiling height, chase walls, equipment room size, etc., unless proper written authorization is required from the Engineer to change them. All associated equipment shall be coordinated and clearly shown on the Shop Drawings.
11. Submittal data for each section must be complete. Partial submittals, or submittals not in the specified format, will be rejected and returned to the Contractor without further review.
- J. All equipment installed on this project shall have **local (within 125 miles)** representation, local factory-authorized service, and a local stock of repair parts. This requirement is essential and will be strictly reviewed by the Owner's Representative prior to concurrence with the Contractor's approval for all submittals covered by electrical division sections.
- K. Physical Size of Equipment: Space is critical; therefore, equipment of larger sizes than shown, even though of approved manufacturer, will not be acceptable unless it can be demonstrated that ample space exists for proper installation, operation, and maintenance.
- L. These paragraphs related to electrical divisions submittal data rescind, amend, and supersede any provisions to the contrary contained in the Project Manual.

1.12 CERTIFICATION OF SUBMITTAL DATA

- A. The Contractor shall provide the following notarized certificate with all submittal data furnished to the Owner's Representative for review and comment.

Project Title:

Description of Submittal Data:

This is to certify that the above-described submittal data has been reviewed and is approved for compliance with the Contract Documents, manufacturer's recommendation, adequacy, clearances, code compliance, safety, and coordination with other trades and/or work except as follows: (list "none" or itemize and explain). In addition, the Contractor shall submit to the Owner's Representative a signed statement from each representative certifying as follows:

EXCEPTIONS:

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“I certify that the materials and/or equipment listed below have been personally inspected by the undersigned authorized manufacturer’s representative and is properly installed and operating in accordance with the manufacturer’s recommendations and are asbestos free.”

Notary

1.13 ACCEPTANCE OF MATERIALS AND EQUIPMENT

- A. Owner’s Manual: After the submittals have been accepted the Contractor is requested to include a minimum of three (3) additional copies for insertion in the project’s Owner’s Manuals at the completion of the project.
- B. **NOTICE: The Contractor is responsible for providing materials and equipment that conform to the requirements of the project manual in every respect unless a deviation has been “accepted” in writing. Removal of any nonconforming materials and equipment and the replacement with conforming materials and equipment shall be at the Contractor’s sole expense, regardless of when nonconformance was discovered. If the owner or owners representative elects to keep the equipment it shall be contractors responsibility to provide any additional connections or services required to make the equipment function as specified or required by the manufacturer. The contractor shall coordinate with other subs for any different material requirements (wire size, breakers, cooling, mounting requirements, etc.).**
- C. Approval of materials and equipment shall be based on manufacturer’s published data and shall be tentatively subject to the submission of complete shop drawings which comply with the contract documents. Approval is also dependent upon the existence of adequate and acceptable clearances for entry, servicing, and maintenance.
- D. Approval of materials and equipment under this provision shall not be construed as authorizing any deviations from the specifications, unless the attention of the Owner’s Representative has been directed in writing to the specific deviations. Data submitted shall not contain unrelated information unless all pertinent information is properly identified.

1.14 SHOP DRAWINGS

- A. As soon as practicable after the award of contract and approval of materials and equipment, but prior to installation, complete and detailed shop drawings of the following shall be submitted for review and comment:
 - 1. Equipment arrangements.
 - 2. Fire alarm system.
 - 3. Data drops.
 - 4. Security system.
 - 5. Equipment foundations.
 - 6. Factory-fabricated equipment and materials.
 - 7. Anchors.

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8. Control.
 9. Interlock.
 10. Switch gear configuration.
 11. Other details as directed by the Owner's Representative. Composite drawings of areas requiring coordination between trades shall be provided and expedited to eliminate conflicts and to ensure maximum cooperation and work progress.
- B. Work performed without benefit of reviewed and approved shop drawings **will not be recommended for payment by the Engineer** until such time as the shop drawings are submitted, reviewed, and approved. Any work performed without the benefit of reviewed and approved shop drawings may require removal, relocation, and/or replacement at the Contractor's sole expense in order to resolve conflicts between the various systems and provide the performance specified.
- C. All installation of equipment, fixtures, terminal devices, etc. shall be made in accordance with approved composite shop drawings. The Contractor shall modify installation and relocate installed work to provide code clearances, service access, and eliminate conflict with other systems.
- D. Submit one copy of shop drawings with each submittal. The shop drawing shall be marked with the A/E comments and returned to the Contractor for printing and distribution. Distribution shall include the return of three (3) prints of the approved shop drawings, with the A/E's comments included, to the A/E for the A/E's and Owner's use.

1.15 SITE OBSERVATION

- A. Site observation by the Architect, Engineer, and/or Owner's Representative is for the express purpose of verifying compliance by the Contractor with the contract documents, and shall not be construed as construction supervision nor indication of approval of the manner or location in which the work is being performed as being a safe practice or place.

1.16 SUPERVISION

- A. In addition to the Superintendent required under the conditions of the contract, each subcontractor shall keep a competent superintendent or foreman on the job at all times.
- B. It shall be the responsibility of each superintendent to study all plans and familiarize himself with the work to be done by other trades. He shall coordinate his work with other trades and, before material is fabricated or installed, make sure that his work will not cause an interference with another trade. Where interferences are encountered, they shall be resolved at the jobsite by the superintendents involved. Where interferences cannot be resolved without major changes to the plans, the matter shall be referred to the Owner's Representative for comments.

1.17 OPERATION PRIOR TO COMPLETION

- A. When any piece of electrical equipment is operable and it is to the advantage of the Contractor to operate the equipment, he may do so, providing that he properly supervises the operation and has the written permission of the Owner's Representative to do so. The contractor shall energize the power distribution in a timely manner to facilitate completion of other trades work. Electrical lighting shall be energized after ceiling has been completed.

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New permanent fixtures shall not be used as temporary under any circumstances. The warranty period shall not commence, however, until such time as the equipment is operated for the beneficial use of the Owner or date of substantial completion, whichever occurs first.

- B. Regardless of whether or not the equipment has or has not been operated, the Contractor shall properly clean the equipment, properly adjust, and complete all deficiency list items before final acceptance by the Owner. The date of acceptance and the start of the warranty may not be the same date.

1.18 MANUFACTURER'S RECOMMENDATIONS

- A. The manufacturer's published directions shall be followed in the delivery, storage, protection, installation, piping, and wiring of all equipment and material. The Contractor shall promptly notify the Owner's Representative, in writing, of any conflict between the requirements of the contract documents and the manufacturer's directions, and shall obtain the Owner's Representative's comments before proceeding with the work. Should the Contractor perform any such work that does not comply with the manufacturer's directions or applicable comments from the Owner's Representative, he shall bear all costs arising in connection with the correction of such deficiencies.

1.19 CHECKING AND TESTING MATERIALS AND/OR EQUIPMENT

- A. Before final acceptance of the work, an authorized representative of the manufacturer of the installed materials and/or equipment shall personally inspect the installation and operation of his materials and/or equipment to determine that it is properly installed and in proper operating order. Testing and checking shall be accomplished during the course of the work where required by work being concealed, and at the completion of the work otherwise. In addition, the Contractor shall submit to the Owner's Representative a signed statement from each representative certifying as follows:

"I certify that the materials and/or equipment listed below have been personally inspected by the undersigned authorized manufacturer's representative and is properly installed and operating in accordance with the manufacturer's recommendations and are asbestos free."

1.20 OPERATING AND MAINTENANCE INSTRUCTION

- A. The Contractor shall prepare for the owner's manual hereinafter specified complete sets of operating and maintenance instructions, control and interlock diagrams, manuals, parts lists, etc. for each item of equipment. These are to be assembled as hereinafter specified for owner's manual.
- B. In addition, the Contractor shall provide the service of a competent engineer or a technician acceptable to the Owner's Representative to instruct a representative of the Owner in the complete and detailed operation of all equipment and systems. These instructions shall be provided for a period of sufficient duration to fully accomplish the desired results. Upon completion of these instructions, a letter of release will be required, acknowledged by the Owner, stating the dates of instruction and personnel to whom instructions were given.
- C. Additional diagrams, operating instructions, etc. shall be provided as specified hereinafter in the other sections of these specifications.

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1.21 MATERIAL AND EQUIPMENT SCHEDULES

- A. Contractor shall refer to both drawings and specification for schedules. Where reference is made to items “scheduled on drawings” or “scheduled in specifications,” same shall include schedules contained in both the drawings and the specifications. The Contractor’s attention is directed to the various specification sections and drawings for schedules.

1.22 APPLICABLE CODES AND STANDARDS

- A. The installation shall meet the minimum standards prescribed in the latest editions of the following listed codes and standards, which are made a part of these specifications, except as may be hereinafter specifically modified in these specifications and associated drawings.
1. National Fire Protection Association Standards (NFPA):
 - a. NFPA No. 10, Portable Fire Extinguishers
 - b. NFPA No. 54, National Fuel and Gas Code
 - c. NFPA No. 70, National Electrical Code
 - d. NFPA No. 101, Life Safety Code
 - e. NFPA No. 255, Method of Test of Surface Burning Characteristics of Building Materials
 2. American National Standards Institute (ANSI):
 - a. C.2, 1984 National Electrical Safety Code
 - b. A117.1, Handicapped Code
 3. American Society of Mechanical Engineers (ASME): Section IV, V, CSD-1
 4. American Society of Testing Materials (ASTM): All applicable manuals and standards.
 5. National Electrical Manufacturers’ Association (NEMA): All applicable manuals and standards.
 6. State Occupational Safety Act: All applicable safety standards.
 7. Occupational Safety and Health ACT (OSHA): National Sanitation Foundation, Standard No. 2
 8. Americans with Disabilities Act, 1990
 9. American Gas Association (AGA)
 10. Underwriters Laboratories, Inc. (UL)
 11. Applicable State Building Codes (Uniform Building Codes, as amended):
 12. All County codes related to mechanical, electrical, plumbing, and system equipment; piping; conduit; wiring; etc. furnished and installed under these specifications.
 13. All City ordinances related to mechanical, electrical, plumbing, and systems and equipment; piping; conduit; wiring; etc. furnished and installed under these specifications.
 14. Refer to specification sections heretofore bound for additional codes and standards.
- B. All materials and workmanship shall comply with all applicable city, state, and national codes, specifications, and industry standards. All materials shall be listed by the Underwriters Laboratories, Inc. as conforming to its standards and so labeled in every case where such a standard has been established for the particular type of material in question.
- C. The contract documents are intended to comply with the aforementioned rules and regulations; however, some discrepancies may occur. Where such discrepancies occur, the Contractor shall immediately notify the Owner’s Representative in writing of said discrepancies and apply for an interpretation. Should the discovery and notification occur after the execution of a contract, any additional work required for compliance with said regulations shall be paid for as covered by Division 1 of these contract documents, providing no work or fabrication of materials has been accomplished in a manner of noncompliance.

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Should the Contractor fabricate and/or install materials and/or workmanship in such a manner that does not comply with the applicable codes, rules, and regulations, the Contractor who performed such work shall bear all costs arising in correcting these deficiencies to comply with said rules and regulations.

1.23 DEFINITIONS

- A. Refer to the condition of the contract for Division 1 for additional requirements regarding definitions.
- B. Where “as required” is used in these specifications or on the drawings, it shall mean “that situations exist that are not necessarily described in detail or indicated that may cause the Contractor certain complications in performing the work described or indicated. These complications entail the normal coordination activities expected of the Contractor where multiple trades are involved and new or existing construction causes deviations to otherwise simplistic approaches to the work to be performed. The term shall not be interpreted to permit an option on the part of the Contractor to achieve the end result.”
- C. Where “and/or” is used in these specifications or on the drawings, it shall mean “that situations exist where either one or both conditions occur or are required and shall not be interpreted to permit an option on the part of the Contractor.
- D. Unless specifically indicated otherwise elsewhere in these specifications or on the drawings the word “furnish” or any of its derivatives shall be understood to indicate the purchase, delivery, storage and protection of an item at the job site in a location and manner suitable for use by the recipient who will be responsible for installation of this item. The word “install” or any of its derivatives shall be understood to indicate taking receipt of an item, properly mounting it, and providing the related utilities (electrical, communication, etc.) for proper and complete operation of the item. Installation shall also include calibration, programming and operational testing of said item. The word “provide” or any of its derivatives shall be understood to indicate both furnishing and installing an item.

1.24 SUBSTANTIAL COMPLETION

- A. Refer to Division 1 for additional requirements for substantial completion.
- B. Substantial completion shall be defined as the level of project completion where the owner is ready to occupy the building. The contractor shall have ensured that all mechanical, electrical, plumbing, and building systems (elevators, automatic doors, hardware, security, etc.) are complete and in fully functional working order. This level of completion does not absolve the contractor from the requirements of final inspection or final acceptance. The contractor shall ensure there are no life safety issues unresolved with the project at the time of substantial completion.
- C. All “punch” list items shall have been resolved or shall be identified as pending resolution. Items listed as unresolved shall be either pending information or direction from the owner or owners representative or shall be awaiting parts or supplies that are “on order”. The contractor at the owners discretion shall produce documentation of the part or supply on order status.

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1.25 FINAL INSPECTION

- A. Refer to Division 1 for additional requirements for final inspection.
- B. It shall be the responsibility of the Contractor to personally conduct a careful inspection, assuring himself that the work on the project is ready for final acceptance and developing his own "punchlists," before calling upon the Owner's Representative to make a final inspection. Failure of the Contractor to conduct such inspections and provide the Owner's Representative with a copy of his "punchlists" prior to the final inspection shall be adequate cause for the Owner's Representative to cancel any Contractor-requested final inspection.
- C. In order not to delay final acceptance of the work, the Contractor shall conduct his own "final inspections" prior to requesting the Owner's Representative to "final" the project; will have all necessary bonds, guarantees, receipts, affidavits, etc. called for in the various articles of this specification prepared and signed in advance; and together with a letter of transmittal listing each paper included, shall deliver the same to the Owner's Representative at or before the time of said final inspection. The Contractor is cautioned to check over each bond, receipt, etc. before preparing same for submission to see that the terms check with the requirements of the specifications.
- D. The final inspection will be made jointly by the Owner's Representative and the Owner.

1.26 REQUIREMENTS FOR FINAL ACCEPTANCE

- A. Requirements for final acceptance shall include but not be limited to the Contractor accomplishing the following:
 - 1. Construction: Complete all construction.
 - 2. Deficiency Lists: Correct all deficiencies listed at time of Substantial Completion.
 - 3. Owner's Manual: Submit at least 30 days prior to final acceptance one (1) copy of the owner's manual for the Owner's Representative's review and comments. Following acceptance, prepare three (3) copies of bound and indexed owner's manual, to be delivered at the time of final acceptance, which shall include but not be limited to the following:
 - a. System operating instructions.
 - b. System control drawings.
 - c. System interlock drawings.
 - d. System maintenance instructions.
 - e. Manufacturers', suppliers', and subcontractors' names, addresses, and telephone numbers, both local representatives and manufacturers' service headquarters.
 - f. Equipment operating and maintenance instructions and parts lists.
 - g. Manufacturers' certifications (see Checking and Testing Materials and/or Equipment, this section).
 - h. Contractor's warranty.
 - i. Acceptance certificates of authorities having jurisdiction.
 - j. Log of all tests made during course of work.
 - k. Owner's acknowledgment of receipt of instruction, enumerating items in owner's manual.
 - l. List of manufacturers' guarantees executed by the Contractor.
 - m. Owner's acknowledgment of items of equipment or accessories indicated or specified to be turned over to Owner.
 - 4. Instructions:

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- a. Verbal, as herein specified.
- b. Posted, framed under glass or plastic laminated:
 - 1) System operating instructions.
 - 2) System control drawings.
 - 3) System interlock drawings.
5. Record Drawings: Deliver the specified record drawings to the Owner's Representative.

1.27 RECORD DRAWINGS

- A. The Contractor shall maintain a set of contract drawings at the job site on which he shall indicate the installed locations of all equipment, electrical lighting, data drops, fire alarm devices, PA system devices, security devices, outlets, and electrical feeders. These drawings shall be used for reference or construction and shall not leave the field office. Upon completion of the work, the Contractor shall obtain and pay for Mylar's and/or disks (if available as CAD files) of the contract drawings from the Owner's Representative and transfer the above information to these Mylar's to provide "Record Drawings." The above-mentioned prints and "Record Drawings" shall then be delivered to the Owner's Representative. Refer to paragraph entitled "Record "Drawings" of the Supplemental General Conditions.

1.28 ALLOWANCES

- A. Refer to Division 1 for allowances.

1.29 ALTERNATE PROPOSALS

- A. Alternate proposals are summarized in Division 1 and on the bid proposal form. Refer to all sections of the specifications and the drawings to determine the exact extent and scope of the various alternate proposals as each pertains to the work of the various trades.

1.30 WARRANTY

- A. General: All work performed (including equipment and materials furnished) under the various sections of these specifications shall be 100% warranted, for a period of one (1) year from the date of substantial completion thereof, against defective materials, design, and unauthorized substitution. Upon receipt of note of failure of any part of the guaranteed equipment and/or facilities during the guaranty period, the affected part(s) or facilities shall be replaced promptly with new parts, etc. by and at the expense of the Contractor. Further, the Contractor shall properly obtain, execute, and forward any and all manufacturer's warranties on equipment furnished under the Contract. Refer to Division 1 for additional requirements.
- B. Extended Period: The Contractor shall provide all extended time warranties available from the manufacturer of the equipment provided as standard at no additional cost. This includes all extended warranties where specified with certain equipment as directed in other sections of this Specification.

1.31 SPARE PARTS

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- A. Spare Parts Data: As soon as practicable after approval of materials and equipment and, if possible, not later than four months prior to the date of beneficial occupancy, the Contractor shall furnish spare parts data for each different item of equipment listed. The data shall include a complete list of parts and supplies with current unit prices and sources of supply, a list of parts and supplies that are either normally furnished at no extra cost with the purchase of the equipment or specified hereinafter to be furnished as part of the Contract, and a list of additional items recommended by the manufacturer to assure efficient operation for a period of 120 days at the particular installation. The foregoing shall not relieve the Contractor of any responsibilities under the warranty specified.

PART 2 - PRODUCTS

2.1 MATERIALS AND WORKMANSHIP

- A. All materials, unless otherwise specified, shall be current United States manufacture, new, free from all defects, and of the best quality. Foreign goods specifically approved for use by the Owner's Representative prior to bidding may be furnished.
- B. Materials and equipment shall be installed in accordance with the manufacturer's recommendations and the best standard practice for the type of work involved. All work shall be executed by electricians skilled in their respective trades, and the installations shall present a neat, precise appearance.
- C. The responsibility for the furnishing and intended installation of the proper electrical equipment and/or material as intended rests entirely upon the Contractor. The Contractor shall request advice and supervisory assistance from the representative of specific manufacturers during the installation.

2.2 MATERIAL AND EQUIPMENT REQUIREMENTS

- A. Manufacturer's Instructions: The manufacturer's published instructions shall be followed for preparing, assembling, installing, erecting, and cleaning manufacturer materials or equipment, unless otherwise indicated. The Contractor shall promptly notify the Owner's Representative in writing of any conflict between the requirements of the Contract Documents and the manufacturer's direction and shall obtain the clarification of the Owner's Representative before proceeding with the work. Should the Contractor perform any such work that does not comply with the manufacturer's directions or such clarification by the Owner's Representative, he shall bear all costs arising in connection with the correction of the deficiencies.
- B. Storage at Site: The Contractor shall not receive material or equipment at the jobsite until there is suitable space provided to properly protect equipment from rust, drip, humidity, and dust damage from surrounding work. All new or relocated equipment shall be stored inside or protected from the environment. Equipment that is not properly stored shall be replaced by the contractor at no cost to the owner.
- C. Capacities shall be not less than those indicated and shall be such that no component or system becomes inoperative or is damaged because of startup or other overload conditions.

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- D. Conformance to Agency Requirements: Where materials or equipment are specified to be approved, listed, tested, or labeled by the Underwriters Laboratories, Inc., or constructed and/or tested in accordance with the standards as listed in the NEC, the Contractor shall submit proof that the items furnished under this section of the specifications conform to such requirements. The label of the Underwriters Laboratories, Inc. applied to the item will be acceptable as sufficient evidence that the items conform to such requirements.
- E. Nameplates: Each major component of equipment shall have the manufacturer's name, address, and model-identification number embossed on a plate securely attached to the item of equipment. All data on nameplates shall be legible at the time of Final Inspection. All equipment starters and disconnects shall be tagged with the equipment designated mark and circuit.
- F. Prevention of Rust: Standard factory finish will be acceptable on equipment specified by model number otherwise surfaces of ferrous metal shall be given a rust-inhibiting coating. The treatment shall withstand 200 hours in salt-spray fog test, in accordance with Method 6061 of Federal Standard No. 141. Immediately after completion of the test, the specimen shall show no signs of wrinkling or cracking and no signs of rust creepage beyond 1/8 inch on either side of the scratch mark. Where rust inhibitor coating is specified hereinafter, any treatment that will pass the above test is acceptable unless a specific coating is specified, except that coal tar or asphalt-type coatings will not be acceptable unless so stated for a specific item. Where steel is specified to be hot-dip galvanized, mill-galvanized sheet steel may be used provided all raw edges are painted with a zinc-pigmented paint conforming to Military Specification MIL-P-26915.
- G. Protection of Connections: Switches, breaker handles, keys setscrews, handles and other parts not listed for normal occupied operation (light switches, etc.) shall be located accessible to but out of paths to prevent their accidental shutoff.
- H. Verifications of Dimensions: The Contractor shall be responsible for the coordination and proper relation of his work to the building structure and to the work of all trades. The Contractor shall visit the premises and thoroughly familiarize himself with all details of the work and working conditions, to verify all dimensions in the field, and to advise the Owner's Representative of any discrepancy before performing any work. Adjustments to the work required in order to facilitate a coordinated installation shall be made at no additional cost to the Owner, Architect, or Engineer.
- I. Standard Products: Materials and equipment to be provided shall be the standard catalog products of manufacturers regularly engaged in the manufacture of products conforming to these specifications, and shall essentially duplicate materials and equipment that have been in satisfactory use at least two years.

2.3 SUBSTITUTION OF MATERIALS AND EQUIPMENT

- A. No substitution of materials or equipment herein specified or called for on the drawings will be permitted, except by written permission of the Owner's Representative. Where several makes of equipment or material are mentioned, any item named may be bid upon provided it meets space, capacity specifications, finish, usage (switching, ballasts, similar operation), and looks and functions as what was specified.
- B. Do not submit substitutions that do not match in whole what was specified or scheduled. Deviations from scheduled or specified items are installed at the contractors risk and are

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subject to replacement if the owner/engineer deems the product different from the specified item.

- C. If the specified item is no longer available, it is the contractors responsibility to contact the architect/engineer and notify that the item is not available and suggest a suitable substitution that matches in whole the form, function, and appearance of the scheduled or specified item.
- D. Refer to Conditions of the Contract and Division 1 for additional requirements regarding substitutions.

2.4 FLAME SPREAD AND SMOKE DEVELOPED PROPERTIES OF MATERIALS

- A. Plenum cable, conduit, insulation, equipment support and mounting hardware, tapes, adhesives, core materials, jackets, and other materials in concealed locations, including any above-ceiling area, shall have a flame spread rating not over 25 without evidence of continued progressive combustion and a smoke developed rating no higher than 50. Flame spread and smoke developed ratings shall be in accordance with NFPA Standard No. 255.

2.5 MOTORS

- A. The Contractor shall provide all motors required for equipment supplied under each portion of the work. Motors shall be built in accordance with the latest ANSI, IEE, and NEMA standards, shall be fully coordinated with the equipment served, shall be of sizes and electrical characteristics scheduled.

2.6 STARTING EQUIPMENT

- A. Each motor shall be provided with proper starting equipment. This equipment, unless hereinafter specified or scheduled to the contrary, shall be provided by the trade furnishing the motor. All motor starting equipment provided by any one trade shall be of the same manufacture unless such starting equipment is an integral part of the equipment on which the motor is mounted.

2.7 SLEEVES, INSERTS, AND FASTENINGS

- A. General: Proper openings through floors, masonry walls, roofs, etc. for the passage of conduits shall be provided. All conduit through floors and walls must pass through sleeves, except conduit that is cast-in-place. Sleeves shall be set in new construction before concrete is poured, as cutting holes through any part of the concrete will not be permitted unless acceptable to the Owner's Representative.
- B. Materials: Sleeves shall be of standard weight galvanized iron pipe, except heavy-gauge galvanized iron sleeves may be utilized in concrete pours where acceptable to the Owner's Representative for size and metal gauge. Sleeves in fittings, grade beams, and where pipes enter or leave the building or pass through concrete or masonry shall be Schedule 40 PVC along the pipe route from the underground installation to the insulating coupling installed above ground.

2.8 FOUNDATIONS

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- A. General: All special foundations and supports required for the proper installation of equipment and pipe shall be provided as hereinafter specified and under the section of the specifications covering the equipment, unless otherwise indicated on the drawings.
- B. Concrete foundations for the support of equipment such as floor-mounted transformers, switchgear, equipment, etc. shall be not less than 5 inches high and 4 inches beyond the equipment, unless otherwise noted, and shall be poured in forms built of new dressed lumber. All corners of the foundations shall be neatly chamfered by means of sheet metal or triangular wood strips nailed to the form. Foundation bolts shall be placed in the forms when the concrete is poured, the bolts being correctly located by means of templates. Allow 1 inch below the equipment bases for alignment and grouting. Foundations for equipment located on the exterior of the building shall be provided as indicated. Foundations shall be constructed in accordance with approved shop drawings and shall be reinforced with #4 bars at 12 inches on center both ways (minimum). Refer to Division 3: Concrete Work for materials, placement, etc. Coordinate with the equipment manufacturer for heavy (greater than 1000 pounds) pieces of equipment.

2.9 ACCESS DOORS

- A. General: Provide wall, ceiling, or duct access doors for unrestricted access to all concealed items of electrical equipment.
- B. Manufacturers shall be Inland-Milcor, Bilco, Miami Carey, or approved equal.
- C. UL labeled when in fire-rated construction, one and one-half hour rating.
- D. Equipment access doors shall be of sufficient size to remove/replace equipment and provide routine maintenance as necessary, unless otherwise noted. All doors shall have wedge-type latches except where cylinder locks are otherwise indicated or specified. Doors shall be set flush with adjacent finish surfaces. Exterior doors shall be provided with cylinder locks.
- E. Access doors into ductwork shall be 14-gauge insulated galvanized steel with 16-gauge galvanized gasketed steel frame and cam-type locks. Access door shall be a minimum of 12" × 12" in size.

2.10 CONDITION OF MATERIALS

- A. All materials required for the installation of the electrical systems shall be new and unused. Any material or equipment damaged in transit from the factory, during delivery to premises, while in storage on premises, while being erected and installed, or while being tested, until time of final acceptance, shall be replaced by this Contractor without extra cost to Owner.

PART 3 - EXECUTION

3.1 SPACE AND EQUIPMENT ARRANGEMENTS

- A. The size of electrical equipment indicated on the drawings is based on the dimensions of a particular manufacturer. While other manufacturers will be acceptable, it is the responsibility of the Contractor to determine whether the equipment he proposes to furnish will fit in the

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space. Shop drawings shall be prepared when required by the Owner's Representative to indicate a suitable arrangement.

- B. All equipment shall be installed in a manner to permit access to all surfaces.

3.2 LARGE APPARATUS

- A. Any large piece of apparatus which is to be installed in any space in the building, and which is too large to permit access through stairways, doorways, or shafts shall be brought to the job and placed in the space before the enclosing structure is completed. Following placement in the space, such apparatus shall be thoroughly, completely protected from damage as hereinafter specified.

3.3 HOISTING, SCAFFOLDING, AND TRANSPORTATION

- A. Provide hoisting and scaffolding facilities as required to set materials and equipment in place.

3.4 PROTECTION

- A. The Contractor shall take such precautions as may be necessary to properly protect all materials and equipment from damage from the time of delivery until the completion of work. This shall include the erection of all required temporary shelters and supports to adequately protect any items stored in the open on the site from the weather, the ground and surrounding work; the cribbing of any items above the floor of the construction; and the covering of items in the uncompleted building with tarpaulins or other protective covering. Failure on the part of the Contractor to comply with the above will be sufficient cause for the rejection of the items in question.
- B. The Contractor shall protect existing facilities, the work of others, and the premises from any and all damages that may be made possible by the execution of work.
- C. Equipment and materials shall be protected from rust both before and after installation. Any equipment or materials found in a rusty condition at the time of final inspection must be cleaned of rust and repainted as specified elsewhere in these specifications.

3.5 COOPERATION BETWEEN TRADES AND WITH OTHER CONTRACTORS

- A. Each trade, subcontractor, and/or Contractor must work in harmony with the various trades, subcontractors, and/or Contractors on the job as may be required to facilitate the progress to the best advantage of the job as a whole. Each trade, subcontractor, and/or Contractor must pursue its work promptly and carefully so as not to delay the general progress of the job. This Contractor shall work in harmony with Contractors working under other contracts on the premises.
- B. It shall be the responsibility of each trade to cooperate fully with the other trades on the job to help keep the jobsite in a clean and safe condition. At the end of each day's work, each trade shall properly store all of its tools, equipment, and materials and shall clean its debris from the job. Upon the completion of the job, each trade shall immediately remove all of its tools, equipment, any surplus materials, and all debris caused by its portion of the work.

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3.6 PRECEDENCE OF MATERIALS

- A. These specifications and the accompanying drawings are intended to cover systems which will not interfere with the structural design of the building, which will fit into the several available spaces, and which will ensure complete and satisfactory systems. Each subcontractor and/or trade shall be responsible for the proper fitting of his material and apparatus into the building.

- B. The work of the various trades shall be performed in the most direct and workmanlike manner without hindering or handicapping the work of other trades. Piping interferences shall be handled by giving precedence to pipe lines which require a stated grade for proper operation. Where space requirements conflict, the following order or precedence shall, in general, be observed:
 - 1. Building lines.
 - 2. Structural members.
 - 3. Soil and drain piping.
 - 4. Condensate drains.
 - 5. Vent piping.
 - 6. Supply, return, and outside air ductwork.
 - 7. Exhaust ductwork.
 - 8. HVAC water and steam piping.
 - 9. Steam condensate piping.
 - 10. Fire protection piping.
 - 11. Natural gas piping.
 - 12. Domestic water (cold and hot).
 - 13. Refrigerant piping.
 - 14. Electrical conduit.

3.7 CONNECTIONS FOR OTHERS

- A. This Contractor shall rough-in for and make all electrical connections to all fixtures, equipment, machinery, etc. provided by others in accordance with detailed roughing-in drawings provided by the equipment suppliers, by actual measurements of the equipment connections, or as detailed.

- B. After the equipment is set in place, this Contractor shall make all final connections and shall provide all required conduit, fittings, whips, connectors, etc.

- C. The Mechanical Contractors will set in place, ready for connection, all motors to be provided under their Contracts. The Mechanical Contractors will furnish and deliver all starter and control equipment not shown in motor control centers for any motors which they furnish. The Mechanical Contractor shall be responsible for the complete installation of all automatic temperature control systems, including wire, conduit, and interlocking connections.

- D. The Electrical Contractor shall connect all motors and shall set in place all control devices, furnishing supports if and as necessary, and shall furnish and install all interconnecting line voltage wiring and make all connections ready for operation between motors, starters, and disconnect switches, as required. The Electrical Contractor shall furnish and install all motor control centers, including breakers, starters, etc. The Contractor shall refer to the Mechanical drawings and specifications for his scope of the connections to equipment furnished under these Contracts.

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3.8 INSTALLATION METHODS

- A. Where to Conceal: All conduits shall be concealed in chases, walls, furred spaces, below suspended floors, or above the ceilings of the building unless otherwise indicated. All concealed conduit shall be run in a professional manner, and parallel or perpendicular to the building lines.
- B. Where to Expose: In mechanical rooms, only where necessary, conduit may be run exposed. All exposed conduit shall be run in the neatest, most inconspicuous manner, and parallel or perpendicular to the building lines. Conduit shall be bent in a manner as to run parallel to other conduits and not cross at angles.
- C. Support: All conduit shall be adequately and properly supported from the building structure by means of hangers or clamps to walls as herein specified.
- D. Maintaining Clearance: Where limited space is available above the ceilings and below concrete beams or other deep projections, conduit shall be sleeved through the projection where it crosses, rather than hung below them, in a manner to provide maximum above-floor clearance. Sleeves shall be as herein specified. Approval shall be obtained from the Owner's Representative for each penetration.
- E. All conduits, etc. shall be cut accurately to measurements established at the building and shall be worked into place without springing or forcing. All conduits run exposed in machinery and equipment rooms shall be installed parallel to the building lines. Conduits in furred ceilings and in other concealed spaces may be run at angles to the construction but shall be neatly grouped and racked indicating good workmanship. All conduit openings shall be kept closed until the systems are closed with final connections.
- F. Special Requirements:
 - 1. The Contractor shall study all construction documents and carefully lay out all work in advance of fabrication and erection in order to meet the requirements of the extremely limited spaces. Where conflicts occur the Contractor shall meet with all involved trades and the Owner's Representative and resolve the conflict prior to erection of any work in the area involved.
 - 2. All conduit not directly buried in the ground or installed outside shall be considered as "interior."
 - 3. Prior to the installation of any ceiling material, gypsum, plaster, or acoustical board, the Contractor shall notify the Owner's Representative so that arrangements can be made for an inspection of the above-ceiling area about to be "sealed off." The Contractor shall give as much advance notice as possible up to ten (10) working days, but in no case less than five (5) working days.
 - 4. The purpose of this inspection is to verify the completeness and quality of the installation of the electrical systems and any other special above-ceiling systems, such as data, fire alarm, security. The ceiling supports (tee bar or lath) should be in place so that access panel and light fixture locations are identifiable and so that clearances and access provisions may be evaluated.
 - 5. No ceiling material shall be installed until the deficiencies listed from this inspection have been corrected to the satisfaction of the Owner's Representative.

3.9 CUTTING AND PATCHING

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- A. General: Cut and patch walls, floors, etc. resulting from work in existing construction or where made necessary by failure to provide proper openings or recesses in new construction.
- B. Methods of Cutting: Openings cut through concrete and masonry shall be made with masonry saws and/or core drills and at such locations acceptable to the Owner's Representative. Impact-type equipment will not be used except where specifically acceptable to the Owner's Representative. Openings in concrete for pipes, conduits, outlet boxes, etc. shall be core drilled to exact size. **Determine location of embedded conduit and reinforcing bars prior to cutting.**
- C. Restoration: All openings shall be restored to "as-new" condition under the appropriate specification section for the materials involved, and shall match remaining surrounding materials and/or finishes.
- D. Masonry: Where openings are cut through masonry walls, provide and install lintels or other structural supports to protect the remaining masonry. Adequate supports shall be provided during the cutting operation to prevent any damage to the masonry occasioned by the operation. All structural members, supports, etc. shall be of the proper size and shape, and shall be installed in a manner acceptable to the Owner's Representative.
- E. Plaster: All mechanical work in area containing plaster shall be completed prior to the application of the finish plaster coat. Cutting of finish plaster coat will not be permitted.
- F. Weakening: No cutting, boring, or excavating which will weaken the structure shall be undertaken.

3.10 SLEEVES, INSERTS, AND FASTENINGS

- A. Sleeves: The minimum clearance between horizontal conduit and sleeve shall be $\frac{1}{4}$ inch, except that the minimum clearance shall be $\frac{1}{2}$ inch where piping contacts the ground. Sleeves through floors shall extend $\frac{3}{4}$ inch above the floor; sleeves through walls and partitions shall be installed flush with exposed surfaces. Sleeves are not required for piping indicated to the cast-in-concrete slabs-on-fill.
- B. Inserts: Suitable concrete inserts for conduit and equipment hangers shall be set and properly located for all conduit and equipment to be suspended from concrete construction.
- C. Fasteners: Fastening of pipes, conduits, etc. in the building shall be as follows:
 - 1. To wood members: by wood screws.
 - 2. To masonry and concrete: by threaded metal inserts, metal expansion screws, or toggle bolts, whichever is appropriate for the particular type of masonry or concrete.
 - 3. To steel: machine screws or welding (when specifically permitted or directed), or bolts.
- D. Weatherproofing: The annular space between a conduit and its sleeve in exterior walls or through floor to below grade shall be filled with polyurethane foam rods 50% greater in diameter than the space as backing and fill material and made watertight with a permanent elastic polysulfide compound. Seal both surfaces of wall or floor with a fire-resistant sealant.

3.11 FLOOR AND CEILING PLATES

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- A. Except as otherwise noted, provide one-piece chrome-plated brass floor and ceiling plates (or escutcheons) around all pipes, conduits, etc. passing through walls, floors, or ceilings in any spaces, except underfloor and attic spaces. Plates shall be sized to fit snugly against the outside of the conduit. Plates will not be required for piping where sleeves extend $\frac{3}{4}$ of an inch above finish floor and are concealed. Plates shall be one piece.

3.12 FIRE AND SMOKE PARTITION, WALL, AND/OR FLOOR PENETRATIONS

- A. Conduit passing through fire- or smoke-rated floors, partitions, walls, or other barriers within a UL-listed assembly which shall maintain the rating of the applicable wall, floor, partition, or barrier. Flexible conduit shall not be used in rated walls. Provide connections between “hard” pipe and flexible whips on either side of wall. Fireproof around conduits.
- B. The Contractor shall review the architectural and structural drawings and determine the location of the fire-rated building elements. Where these elements are penetrated, UL-listed fire-rated penetration assemblies approved by the local authority shall be provided in accordance with the manufacturer’s instructions to obtain the required rating.

3.13 METAL BUILDING SYSTEMS/ELECTRICAL SUPPORTS

- A. Metal building systems are required to be designed by the manufacturer to accommodate and support the electrical systems indicated on the electrical drawings and specifications.
- B. The metal building systems manufacturer is required to provide the following:
 - 1. Framed openings through the roofs with supports, roof curbs, and flashings for roof-mounted equipment, fans, vents, and air intakes.
 - 2. Structural support for piping, conduits, and suspended equipment consisting of beam, joists, purlins, and/or blocking above and perpendicular to conduit routes and equipment hangers at intervals not to exceed 8 feet.
 - 3. Structural support for suspended ceilings and light fixtures, including associated raceways.
- C. The electrical trade shall:
 - 1. Provide all routes, weights, installation heights, opening locations, etc. for all equipment, conduits, sleeves, etc. to the metal building system manufacturer and coordinate requirements for structural supports, hangers, attachments, etc. with the metal building systems manufacturer.
 - 2. Provide all supporting devices (hangers, attachments, brackets, cross beams, etc.) to attach to the metal building structural system.

3.14 CONDUIT SUPPORT

- A. Conduit Support: All conduits throughout the building, both horizontal and vertical, shall be adequately supported from the construction to line of grade, with proper provision for expansion, contraction, vibration elimination, and anchorage. Vertical conduits shall be supported from floor lines with riser clamps sized to fit the lines and to adequately support their weight. At the bases of lines, where required for proper support, provide anchor base fittings or other approved supports.
- B. Conduit shall not be supported from any other system.

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3.15 HANGERS

- A. General: Each hanger shall be properly sized to fit the supported pipe or to fit the outside of the insulation on lines where specified.
- B. Attachment:
 - 1. The load on each hanger and/or insert shall not exceed the safe allowable load for any component of the support system, including the concrete which holds the inserts. Reinforcement at inserts shall be provided as required to develop the strength required.
 - 2. Where pipes are supported under steel beams, approved-type beam clamps shall be used.
 - 3. Where conduit is supported under wood joists, hanger rods shall be attached to joists with side beam brackets or angle clips.
- C. Spacing: All hangers shall be so located as to properly support horizontal lines without appreciable sagging of these lines. All PVC shall be supported at intervals recommended by the manufacturer, or as otherwise specified or indicated.
- D. Trapezes: Where multiple lines are run horizontally at the same elevation and grade, they may be supported on trapezes of Kindorf, Elcen, or approved equal, channel-suspended on rods or pipes. Trapeze members including suspension rods shall each be properly sized for the number, size, and loaded weight of the lines they are to support.
- E. Ceiling-Mounted Devices: All lighting and devices or assemblies mounted in lay-in-type ceilings and which are supported by the ceiling grid, directly or indirectly, and which weigh in excess of 2 lbs., shall be provided with at least two 12-gauge minimum wire supports connected securely between the device or assembly and the structure, to serve as a safety support in the event of the collapse of or a disturbance in the support of the ceiling system that might cause the device or assembly to fall through the ceiling. This includes, but is not limited to, light fixtures, J-boxes, and heavy speakers. Provide additional support as required where the weight of the device or assembly will exceed the safe limits of the wire supports.
- F. Perforated strap iron or wire will not be acceptable as hanger material.
- G. Miscellaneous: Provide any other special foundations, hangers, and supports indicated on the drawings, specified elsewhere herein, or required by conditions at the site. Hangers and supporting structures for suspended equipment shall be provided as required to support the load from the building structure in a manner acceptable to the Owner's Representative.

3.16 ACCESS DOORS

- A. Provide in walls, floors, and ceilings to permit access to all equipment and piping requiring service or adjustment. Examples of such equipment needing access are disconnects, actuators, contacts, and equipment needing periodic or replacement maintenance.
- B. Use panels equal to Milcor Style M for masonry and drywall construction, equal to Milcor Style K for plastered masonry walls and ceilings. Stainless steel panels shall be used in ceramic tile or glazed structural tile.
- C. Access doors located outside or in a moisture-laden environment (e.g., toilet room, dressing area, shower area, etc.) shall be stainless steel.

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3.17 ROOF PENETRATIONS AND FLASHING

- A. The contractor shall obtain from the Owner all warranty requirements for new or existing roofing systems and shall have all work on roof penetrations, curbs or equipment supports performed by a subcontractor acceptable to the Owner and the new or existing roofing system installer and manufacturer in order that all roofing system and materials warranties are preserved.
- B. Pipe and conduit ducts, pitch pockets, curb bases, and flashing compatible with the roofing installation shall be provided for roof penetrations. Provide framing or other support around all openings through roof as required to preserve the structural integrity of the roof system and make the penetration weathertight.
- C. Roof curbs for all roofs except standing seam metal roofs shall be provided by the equipment supplier supplying the roof-mounted equipment, etc., and such curbs shall be installed by the roofing trades. Contractor shall coordinate all roof curb requirements with all trades and the roofing trades at the earliest possible stage of the project.
- D. Roof curbs for standing seam metal roofs shall be provided by the roofing trades. Curb base size, height, and type shall be coordinated with the roofing trades at the earliest possible stage of the project.
- E. Flashing for pipe and conduit penetrations of standing seam metal roofs shall be provided and installed by the roofing trades.
- F. See Division 7: Thermal and Moisture Protection for metal roof curbs, flashing, etc.

3.18 ROOFTOP EQUIPMENT

- A. Install all starters and disconnects within 5 feet of equipment being served.
- B. Mount starters and disconnects on the equipment only if allowed or recommended by the manufacturer. Otherwise, mount disconnects on unistrut-style framing in an “L” configuration. Secure unistrut to roof with a flashed wood nailer. Provide cross bracing.
- C. Run “hard” conduit (IMC) through conduit curb to starter or disconnect. Install IMC from starter or disconnect to equipment. Flexible watertight conduit is acceptable only for equipment on a vibration-type (spring) curb or that has movement. This does not include AHU, chillers, fans on factory non-spring curbs, package units, or other internally isolated rooftop equipment.

3.19 TESTS AND INSPECTIONS

- A. Refer to conditions of the contract and Division 1 for additional requirements regarding tests and inspections.
- B. General: The Contractor shall make all tests deemed necessary by the inspection departments of the authority having jurisdiction, Board of Underwriters, etc. He shall provide all equipment, materials, and labor for making such tests. Fuel and electrical energy for system operational tests following beneficial occupancy by the Owner will be paid for by the Owner.

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- C. Other: Additional tests specified hereinafter under the various specifications sections shall be made.
- D. Notification: The Owner's Representative shall be notified at his office 36 hours prior to each test and other specifications requirements requiring action on the part of the Owner, Architect, Engineer, and/or Owner's Representative.
- E. Test Logs: All tests which the Contractor conducts shall have pertinent data logged by the Contractor at the time of testing. Data shall include date, time, personnel, description and extent of system tested, test conditions, test results, specified results, and any other pertinent data. Data shall be delivered to the Owner's Representative as specified under "Requirements for Final Acceptance.
- F. Inspections: In general, an inspection by the Owner's Representative shall be required prior to closing up any work and prior to beneficial occupancy or final project completion. The closing up of work includes, but is not limited to, conduit installations prior to backfilling; electrical and fire protection work prior to placement of concrete; or closing up walls and overhead electrical and fire protection work prior to installation of the ceiling.

3.20 CLEANING AND PAINTING

- A. The contractor shall at all times keep the premises free from accumulations of waste material or rubbish. Debris shall be removed from the site and from any street or alley adjacent to the site.
- B. Thoroughly clean and touch up the finish on all parts of the materials and equipment. Exposed parts in equipment rooms, and all other spaces except sealed chases and attics shall be thoroughly cleaned of cement, plaster, and other materials, and all oil and grease spots shall be removed. Such surfaces shall be carefully wiped and all cracks and corners scraped out.
- C. Exposed metal work which is not galvanized shall be carefully brushed down with steel brushes to remove rust and other spots and left smooth and clean and then painted with a suitable rust resistant primer. Exposed metal work includes work exterior to the building; exposed in mechanical or electrical equipment rooms and storage rooms; and other areas where occupants could see the work, whether normally occupied or not.
- D. All other painting shall be accomplished under the Painting Section of Division 9 of the specifications.
- E. At completion of the project, the Contractor shall remove all tools, scaffolding, and surplus materials. Contractor shall leave the area "broom clean". Before final acceptance, vacuum all panels, switchboards, starters, and other electrical devices. Wipe clean all fixture lenses and reflectors, all panelboard and switchboard interior and exterior surfaces, being careful to remove all stray paint, construction materials, dust, and particles. Touch-up all marred surfaces to restore existing conditions to those provided by the manufacturer.

3.21 IDENTIFICATION AND LABELING

- A. General: The Contractor shall make it possible for the personnel operating and maintaining the equipment and systems in this project to readily identify the various pieces of equipment,

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disconnects, panels, etc. by marking them. All disconnects/starters/panels shall be labeled for the equipment they serve. Marks shall be the same as the drawings.

3.22 COORDINATION OF WORK

- A. The light fixture grid layout as indicated on the drawings must be maintained. This Contractor shall refer to all light fixture plans and details indicated on the drawings.
- B. The electrical trades shall locate all junction boxes, pull boxes, conduits, etc. to avoid interference with the diffusers, dampers, grilles, etc. The mechanical trades shall furnish to all other trades copies of approved ductwork shop drawings to assist in the coordination of the rough-in and installation of all items of work.
- C. The order of space allocation priority in plan and in elevation shall be as follows.
 - 1. 1st Light Fixtures, at Ceiling Soffit + 6"
 - 2. 2nd Grade Plumbing Waste and Vent Systems
 - 3. 3rd Ductwork
 - 4. 4th Pressurized Piping Systems
 - 5. 5th Electrical Conduit
 - 6. 6th Ceiling Support System, where required

3.23 DISCHARGE OF WASTES FROM CONSTRUCTION SITE

- A. The Contractor shall comply with all applicable provisions of local, state, and federal laws regarding the discharge of wastes into sewer and waterways. Special caution shall be exercised to prevent the discharge of wastes which contain oil, tar, asphalt, roofing compound, kerosene, gasoline, paint, mud, cement, lime, or other materials which would degrade the water quality of the receiving water course.
- B. Disposal of Lamps and Ballasts: The proper disposal of all ballasts and lamps from the demolition of lighting fixtures as part of this project will be the responsibility of the Electrical Contractor. All lamps and ballasts found to contain hazardous contaminants will be removed from the site and transported to a licensed disposal facility by a contractor licensed in this field. All work shall be performed in accordance with current state and Federal rules and regulations pertaining to the processing of contaminated waste materials. A certificate of proper disposal from the licensed waste contractor shall be provided to the Engineer.

3.24 OPERATING AND MAINTENANCE MANUAL

- A. The Contractor shall furnish indexed operating and maintenance manuals with complete technical data for each electrical system, piece of equipment, and material installed under this Contract.
- B. The manuals shall be identified on the cover as "Operating and Maintenance Manual" and shall list the name and location of project, the Owner, the Engineers, the General Contractor, and the Subcontractors installing equipment represented in the brochure.
- C. Two (2) copies of the manual, bound in three-ring hardback binders shall be provided. One copy shall be completed and delivered to the Engineer prior to the time that system and equipment tests are performed. The second copy shall be delivered prior to final acceptance.

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The manual shall have a Table of Contents and shall be grouped in tabbed sections according to the specification sections. Each section shall be organized as follows:

1. Approved engineering submittals with complete performance and technical data.
2. Manufacturer's local representative and/or distributor's name and address.
3. Manufacturer's installation instructions and brochures.
4. Manufacturer's operating and maintenance brochures.
5. Manufacturer's installation wiring diagram.
6. Contractor's field wiring diagram, if different.
7. Manufacturer's brochure listing recommended spare parts.
8. Manufacturer's brochure listing replacement part numbers and descriptions.

- D. Provide a final section entitled, "Warranties and Guarantees", for all equipment as well as Contractor's warranty.

3.25 CONDITIONS OF EQUIPMENT AT FINAL ACCEPTANCE

- A. At the time of acceptance, the Contractor shall have inspected all installed systems to assure the following has been completed:
1. Fixtures are operating, and lenses and reflectors are free of dust, debris, and fingerprints.
 2. Panelboards have all conductors neatly formed, bundled, and made-up tight. Cans shall be vacuum cleaned and surfaces cleaned of stray paint, dust, grease, and fingerprints. All circuit directories to be neatly typed and in place.
 3. Wall plates and exposed switch and receptacle parts to be clean, free of paint, plaster, etc.
 4. Safety and disconnect switches and motor starters to be vacuum cleaned of debris and dust, and all surfaces free of stray paint, grease, and fingerprints.
 5. Switchgear, transformers, and system devices shall be cleaned internally and externally and have all surfaces restored to original surface conditions.
 6. Touch-up all scratched surfaces using paint matching the existing equipment paint. Where paint cannot be matched, the entire surface shall be repainted in a color and manner approved by the Engineer.

END OF SECTION 260015

SECTION 260050

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 Division 1 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. Electricity-metering components.
 - 5. Concrete equipment bases.
 - 6. Electrical demolition.
 - 7. Cutting and patching for electrical construction.
 - 8. 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

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- 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 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 Division 8 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 RACEWAYS

- A. See Section "Raceways and Boxes."

2.2 CONDUCTORS

- A. See Section "Conductors and Cables."

2.3 SUPPORTING DEVICES

- A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.

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- B. Metal items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.
- C. Slotted-Steel Channel Supports: Flange edges turned toward web, and 9/16-inch- diameter slotted holes at a maximum of 2 inches o.c., in webs.
- D. Nonmetallic Channel and Angle Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with 9/16-inch- diameter holes at a maximum of 8 inches o.c., in at least one surface.
 - 1. Fittings and Accessories: Products of the same manufacturer as channels and angles.
 - 2. Fittings and Accessory Materials: Same as channels and angles, except metal items may be stainless steel.
- E. Raceways and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.
- F. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.
- G. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for nonarmored electrical cables in riser conduits. Plugs have number and size of conductor gripping holes as required to suit individual risers. Body constructed of malleable-iron casting with hot-dip galvanized finish.
- H. Expansion Anchors: Carbon-steel wedge or sleeve type.
- I. Toggle Bolts: All-steel springhead type.
- J. Powder-Driven Threaded Studs: Heat-treated steel.

2.4 EQUIPMENT FOR UTILITY COMPANY'S ELECTRICITY METERING

- A. Current-Transforming 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, minimum.
- D. Provide power utility company communication conduit to meter.
- E. Relocate communication conduit with meter as required to maintain minimum utility company clearances.

2.5 EQUIPMENT FOR ELECTRICITY METERING BY OWNER

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- A. Meter: Electronic kilowatt-hour/demand measuring to record electricity used and highest peak demand over a time period according to electric utility. Meter is designed for used on the type and rating of circuit indicated for its application.
 - 1. Kilowatt-Hour Display: Digital liquid crystal.
 - 2. Kilowatt-Demand Display: Digital, liquid-crystal type to register highest peak demand.
 - 3. Enclosure: NEMA 250, Type 1, Minimum, with hasp for padlocking or sealing.
 - 4. Memory Backup: Self-contained to maintain memory throughout power outages of 72 hours, minimum.
 - 5. Sensors: Current-sensing type, with current or voltage output, selected for optimum range and accuracy for the ratings of the circuits indicated for this application.
 - a. Type: Solid core.
 - 6. Accuracy: Nationally recognized testing laboratory certified to meet ANSI C12.16 specifications.
 - 7. Demand Signal Communication Interface: Match signal to building automation system input that conveys data on instantaneous/integrated demand level measured by meter used for load switching to control demand.
- B. Current-Transformer Cabinets: Listed or recommended by metering equipment manufacturer for use with sensors indicated.
- C. Available Metering Equipment Manufacturers: Subject to compliance with requirement, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. E-MON Corporation.
 - 2. National Meter Industries, Inc.
 - 3. Osaki Meter Sales, Inc.

2.6 CONCRETE BASES

- A. Concrete: 3000-psi, 28-day compressive strength as specified in Division 3 Section "Cast-in-Place Concrete."

2.7 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.

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- 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.
- E. Mount all non-wall mounted equipment minimum of:
 - 1. Two (2) inches off the wall for switchboards, free standing distribution boards, disconnects, panels and all other non-vibrating equipment.
 - 2. Minimum of four (4) inches for vibrating equipment to include transformers.

3.2 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 design load.

3.3 SUPPORT INSTALLATION

- A. Install support devices to securely and permanently fasten and support electrical components.
- B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.
- C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.
- D. Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.
- E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.
- F. Install ¼-inch-diameter or larger threaded steel hanger rods, unless otherwise indicated.
- G. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 1½ inch 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.

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- 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 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. Steel: Welded threaded studs or spring-tension clamps on steel.
 - a. Field Welding: Comply with AWS D1.1.
 - 6. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.
 - 7. Light Steel: Sheet-metal screws.
 - 8. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

3.4 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.

3.5 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 Division 7 Section "Firestopping."

3.6 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated, but not less than 6 inches larger, in both directions, than supported unit and bollards.
- B. Follow supported equipment manufacturer's anchorage recommendations and setting templates for anchor-bolt and tie locations, unless otherwise indicated. Use 3000-psi, 28-day

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compressive-strength concrete and reinforcement as specified in Sections “Cast-in-Place Concrete,” “Concrete Reinforcement,” and “Concrete Formwork.”

- C. Bollards: Provide bollards around utility provider pad mount transformer. Protect equipment on road or driveway sides.
- D. Provide bollards around owner genset if within 10 feet of roadway.
- E. Provide 36 inch concrete pads in front of exterior switchboards full length of switchboard.
- F. Provide 30 inch concrete pads in front of ground mounted disconnect racks.

3.7 DEMOLITION

- A. Protect existing electrical equipment and installations indicated to remain. If damaged or disturbed in the course of the Work, remove damaged portions and install new products of equal capacity, quality, and functionality.
- B. Accessible Work: Remove exposed electrical equipment and installations, indicated to be demolished, in their entirety.
- C. Abandoned Work: Cut and remove buried raceway and wiring, indicated to be abandoned in place, 2 inches below the surface of adjacent construction. Cap raceways and patch surface to match existing finish.
- D. Remove demolished material from Project site.
- E. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.

3.8 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.

3.9 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.

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- 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.

3.10 REFINISHING AND TOUCHUP PAINTING

- A. Refinish and touch up paint. Paint materials and application requirements are specified in Division 9 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.

3.11 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 260050

SECTION 260519
CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.
- B. Related Sections include “Control/Signal Transmission Media” for transmission media used for control and signal circuits.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Qualification Data: For testing agency.
- C. Field Quality-Control Test Reports: From Contractor.

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. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, all conductors shall be listed for the application, temperature, and insulation rating to which they are intended.

2.2 CONDUCTORS AND CABLES

- A. Refer to Part 3 “Conductor and Insulation Applications” Article for insulation type, cable construction, and ratings.
- B. Conductor Material:

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1. Copper complying with NEMA WC 5 or 7.
 2. Solid conductors, sizes 10 and 12, uncoated copper per ASTM B3.
 3. Stranded conductor, all other sizes, uncoated copper per ASTM B3, ASTM B787, and ASTM B8.
- C. Conductor Insulation Types: Type THHN-THWN and complying with NEMA WC 5 or 7.
1. Rated for sunlight resistance all colors.
 2. Conductors shall be color coded for voltage and phase as per NEC and any local amendments.
 3. Larger conductors shall have taped color coding.
 4. Size, rating, temperature, and type shall be permanently marked on conductor jacket.
 5. Insulation shall be PVC, heat and moisture resistant, flame retardant compound as per UL-83 and UL-1063.
 6. Jacket shall be polyamide outer nylon covering per UL-83 and UL-1063.
- D. Rated for sunlight resistance all colors.

2.3 CONNECTORS

- A. Wire Connectors:
1. Description: Factory-fabricated UL listed connected and of size, ampacity rating, material, type, and class for application and service indicated.
 2. Provide self-locking square wire spring grab screw on wire connectors sized as per NEC and the number of conductors to be connected.
 3. Thermoplastic deep shell design, with wings on smaller connectors, rated for application temperature, Minimum 105 degrees C.
 4. Copper to copper connection, 600V.
 5. Provide high temp wire connectors for all high temperature equipment applications.
- B. Push-in wire connectors are **Not Approved** and shall not be used for any power or lighting circuits above 50V.

2.4 ALTERNATES

- A. Blue Jacketed steel MC Cable is only permitted for 6 foot (maximum) lighting whips. It shall be used for **no** other purpose.
- B. AC cable is **not** permitted at all.

PART 3 - EXECUTION

3.1 CONDUCTOR AND INSULATION APPLICATIONS

- A. Service Entrance: Type THHN-THWN, single conductors in raceway.
- B. Exposed Feeders: Type THHN-THWN, suitable for use in air return plenums.
- C. Feeders Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.

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- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and in Crawlspace: Type THHN-THWN, single conductors in raceway.
- E. Exposed Branch Circuits, including in Crawlspace: Type THHN-THWN, single conductors in raceway.
- F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.
- G. Branch Circuits Concealed in Concrete and below Slabs-on-Grade: Type THHN-THWN, single conductors in raceway.
- H. Underground Feeders and Branch Circuits: Type THHN-THWN, single conductors in raceway.
- I. Cord Drops and Portable Appliance Connections: Type SO, hard service cord.
- J. Fire Alarm Circuits: Power-limited, fire-protective, signaling circuit cable.
- K. Class 1 Control Circuits: Type THHN-THWN, in raceway.
- L. Class 2 Control Circuits: Type THHN-THWN, in raceway.

3.2 INSTALLATION

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Minimum line voltage conductor size is #12.
- C. Neutrals shall not be shared on any single pole circuit.
- D. 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.
- E. Use pulling means; including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.
- F. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- G. Support cables according to Section "Basic Electrical Materials and Methods."
- H. Seal around cables penetrating fire-rated elements according to Section "Through-Penetration Firestop Systems."
- I. Identify and color-code conductors and cables according to Section "Electrical Identification" and adhere to local color code requirements.

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3.3 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturers published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
 - 1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

3.4 FIELD QUALITY CONTROL

- A. Testing: Engage a qualified testing agency to perform the following field quality-control testing:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements.
 - 2. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.
- B. Test Reports: Prepare a written report to record the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

END OF SECTION 260519

SECTION 260526
GROUNDING AND BONDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes grounding 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 Section "Lightning Protection" for additional grounding and bonding materials.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
- C. 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. Testing Agency Qualifications: Testing agency as defined by OSHA in 29 CFR 1910.7 or a member company of the International Electrical Testing Association and that is acceptable to authorities having jurisdiction.
 - 1. Testing Agency's Field Supervisor: Person currently certified by the International Electrical Testing Association to supervise on-site testing specified in Part 3.
- 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 780 and UL 96 when interconnecting with lightning protection system.

PART 2 - PRODUCTS

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2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. 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. Harger Lightning Protection, Inc.
 - j. Hastings Fiber Glass Products, Inc.
 - k. Heary Brothers Lightning Protection, Co.
 - l. Ideal Industries, Inc.
 - m. ILSCO.
 - n. Kearney/Cooper Power Systems.
 - o. Korns: C.C. Korns Co.; Division of Robroy Industries.
 - p. Lightning Master Corp.
 - q. Lyncole XIT Grounding.
 - r. O-Z/Gedney Co.; a business of the EGS Electrical Group.
 - s. Raco, Inc.; Division of Hubbell.
 - t. Robbins Lightning, Inc.
 - u. Salisbury: W.H. Salisbury & Co.
 - v. Superior Grounding Systems, Inc.
 - w. Thomas & Betts, Electrical.

2.2 GROUNDING CONDUCTORS

- A. For insulated conductors, comply with Section “Conductors and Cables.”
- B. Material: Copper.
- C. Equipment Grounding Conductors: Insulated with green-colored insulation.
- D. 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.
- E. Grounding Electrode Conductors: Stranded cable.
- F. Underground Conductors: Bare, tinned, stranded, unless otherwise indicated.
- G. Bare Copper Conductors: Comply with the following:
 1. Solid Conductors: ASTM B 3.
 2. Assembly of Stranded Conductors: ASTM B 8.
 3. Tinned Conductors: ASTM B 33.
- H. Copper Bonding Conductors: As follows:

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1. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, ¼ inch 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_inches wide and 1/16 inches thick.
 4. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 1_inches wide and 1/16 inches thick.
- I. 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.
- J. 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. Ground Rods: Copper-clad steel.
- B. Ground Rods: Sectional type; copper-clad steel.
1. Size: ¾ by 120 inches.
- C. Test Wells: Provide handholes for test wells.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.
- B. In raceways, use insulated equipment grounding conductors.
- C. Exothermic-Welded Connections: Use for connections to structural steel, ground rods, and for underground connections, except those at test wells.
- D. Equipment Grounding Conductor Terminations: Use bolted pressure clamps.
- E. Ground Rod Clamps at Test Wells: Use bolted pressure clamps with at least two bolts.

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- F. 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 from wall and support from wall 6 inches 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.
- G. Underground Grounding Conductors: Use tinned-copper conductor, No. 2/0 AWG minimum. Bury at least 24 inches below grade or bury 12 inches above duct bank when installed as part of the duct bank.

3.2 EQUIPMENT GROUNDING CONDUCTORS

- A. 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.
- B. Install equipment grounding conductors in all feeders and circuits.
- C. 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.
- D. Computer Outlet Circuits: Install insulated equipment grounding conductor in branch-circuit runs from computer-area power panels or power-distribution units.
- E. X-Ray Equipment Circuits: Install insulated equipment grounding conductor in circuits supplying x-ray equipment.
- F. 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.
- G. 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.
- H. Nonmetallic Raceways: Install an equipment grounding conductor in nonmetallic raceways unless they are designated for telephone or data cables.
- I. 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.
- J. 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.

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- K. 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-x2x12-inch grounding bus.
 - 2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.
- L. Metal Poles Supporting Outdoor Lighting Fixtures: Provide a grounding electrode in addition to installing a separate equipment grounding conductor with supply branch-circuit conductors.
- M. Common Ground Bonding with Lightning Protection System: Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.

3.3 COUNTERPOISE

- A. Ground the steel framework of the building with a driven ground rod at the base of every corner column and at intermediate exterior columns at distances not more than 60 feet apart. Provide a grounding conductor (counterpoise), electrically connected to each ground rod and to each steel column, extending around the perimeter of the building. Use tinned-copper conductor not less than No. 2/0 AWG for counterpoise and for tap to building steel. Bury counterpoise not less than 18 inches below grade and 24 inches from building foundation.

3.4 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 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.

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- 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 of bare copper conductor not smaller than No. 4 AWG. If concrete foundation is less than 20 feet 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.

3.5 CONNECTIONS

- A. 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.
- B. 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.
- C. 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.
- D. 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 non-continuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.

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- E. Connections at Test Wells: Use compression-type connectors on conductors and make bolted- and clamped-type connections between conductors and ground rods.
- F. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturers published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- G. 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.
- H. 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.

3.6 UNDERGROUND DISTRIBUTION SYSTEM GROUNDING

- A. Duct Banks: Install a grounding conductor with at least 50 percent ampacity of the largest phase conductor in the duct bank.
- B. Manholes and Handholes: Install a driven ground rod close to wall and set rod depth so 4 inches will extend above finished floor. If necessary, install ground rod before manhole is placed and provide a No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive tape or heat-shrunk insulating sleeve from 2 inches above to 6 inches below concrete. Seal floor opening with waterproof, nonshrink grout.
- C. Connections to Manhole Components: Connect exposed-metal parts, such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields as recommended by manufacturer of splicing and termination kits.
- D. Pad-Mounted Transformers and Switches: Install two ground rods and counterpoise circling pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Use tinned-copper conductor not less than No. 2 AWG for counterpoise and for taps to equipment ground pad. Bury counterpoise not less than 18 inches below grade and 6 inches from the foundation.

3.7 FIELD QUALITY CONTROL

- A. 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

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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. Equipment Rated 500 kVA and Less: 10 ohms.
 - b. Equipment Rated 500 to 1000 kVA: 5 ohms.
 - c. Equipment Rated More Than 1000 kVA: 3 ohms.
 - d. Substations and Pad-Mounted Switching Equipment: 5 ohms.
 - e. 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.

3.8 GRADING AND PLANTING

- A. 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 Division 2 Section "Landscaping." Maintain restored surfaces. Restore disturbed paving as indicated.

END OF SECTION 260526

SECTION 260533
RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
- B. Related Sections include the following:
 - 1. Division 7 Section "Firestopping" for firestopping materials and installation at penetrations through walls, ceilings, and other fire-rated elements.
 - 2. Section "Basic Electrical Materials and Methods" for supports, anchors, and identification products.
 - 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. RNC: Rigid nonmetallic conduit.
- H. PVC-GRS: PVC-Coated galvanized rigid steel.

1.4 SUBMITTALS

- A. Product Data:
 - 1. For surface raceways, wireways and fittings.
 - 2. Floor boxes.
 - 3. Hinged-cover enclosures and cabinets.
 - 4. Conduit spacers.
 - 5. Conduit rack supports.

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- B. Shop Drawings: Show fabrication and installation details of components for raceways, fittings, boxes, enclosures, and cabinets.

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 layout and installation of raceways, boxes, enclosures, cabinets, and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
 - 2. Refer to 3.1, RACEWAY APPLICATION, for materials to be used.

2.2 METAL CONDUIT AND TUBING

- A. Available Manufacturers:
 - 1. AFC Cable Systems, Inc.
 - 2. Alfex, Inc.
 - 3. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - 4. Electri-Flex Co.
 - 5. Grinnell Co./Tyco International; Allied Tube and Conduit Div.
 - 6. Republic Conduit.
 - 7. Manhattan/CDT/Cole-Flex.
 - 8. O-Z Gedney; Unit of General Signal.
 - 9. Wheatland Tube Co.
 - 10. Perma-Cote
 - 11. Plasti Bond
 - 12. KorKap
- B. Rigid Steel Conduit: ANSI C80.1.
- C. IMC: ANSI C80.6.
- D. PVC--Coated Steel Conduit and Fittings: UL514b NEMA RN 1.

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- E. PVC- Coated IMC and Fittings: ETL PVC-001 NEMA RN 1 UL6.
- F. EMT: ANSI C80.3.
- G. FMC: Zinc-coated steel.
- H. LFMC: Flexible steel conduit with PVC jacket.
- I. Fittings: NEMA FB 1; compatible with conduit and tubing materials. Provide fittings factory matched with conduit types.
 - 1. Indoor Fittings: Steel Set Screw or Steel Compression
 - 2. Outdoor Fittings: Threaded fittings on IMC or Rigid Conduit
 - 3. Outdoor Fittings: Compression fittings with gaskets on all transitions to flexible conduit.
 - 4. Die cast fittings are not acceptable anywhere.
 - 5. Provide factory fittings with MC cable where allowed.
 - 6. EMT crimp type fittings are not acceptable.

2.3 NONMETALLIC CONDUIT AND TUBING

- A. Available Manufacturers:
 - 1. American International.
 - 2. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - 3. Amco Corp.
 - 4. Cantex, Inc.
 - 5. Certainteed Corp.; Pipe & Plastics Group.
 - 6. Condux International.
 - 7. ElecSYS, Inc.
 - 8. Electri-Flex Co.
 - 9. Lamson & Sessions; Carlon Electrical Products.
 - 10. Manhattan/CDT/Cole-Flex.
 - 11. RACO; Division of Hubbell, Inc.
 - 12. Thomas & Betts Corporation.
- B. ENT: NEMA TC 13.
- C. RNC: NEMA TC 2, Schedule 40 and Schedule 80 PVC.
- D. LFNC: UL 1660.
- E. Fittings: NEMA TC 3; match to conduit or tubing type and material. Provide fittings factory matched with conduit types.
 - 1. Indoor/Outdoor Fittings: Compression.
 - 2. Outdoor Fittings: Compression fittings with gaskets on all transitions to flexible conduit.

2.4 METAL WIREWAYS

- A. Available Manufacturers:
 - 1. Hoffman.
 - 2. Square D.

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- B. Material and Construction: Sheet metal sized and shaped as indicated, NEMA 1.
- C. 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.
- D. Select features, unless otherwise indicated, as required to complete wiring system and to comply with NFPA 70.
- E. Wireway Covers: Hinged type, or as indicated.
- F. Finish: Manufacturer's standard enamel finish.

2.5 NONMETALLIC WIREWAYS

- A. Available Manufacturers:
 - 1. Hoffman.
 - 2. Lamson & Sessions; Carlon Electrical Products.
- B. Description: Fiberglass polyester, extruded and fabricated to size and shape indicated, with no holes or knockouts. Cover is gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections are flanged, with stainless-steel screws and oil-resistant gaskets.
- C. Description: PVC plastic, extruded and fabricated to size and shape indicated, with snap-on cover and mechanically coupled connections with plastic fasteners.
- D. 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.
- E. Select features, unless otherwise indicated, as required to complete wiring system and to comply with NFPA 70.

2.6 SURFACE RACEWAYS

- A. Surface Metal Raceways: Galvanized steel with snap-on covers. Finish with manufacturer's standard prime coating.
 - 1. Available Manufacturers:
 - a. Airey-Thompson Sentinel Lighting; Wiremold Company (The).
 - b. Thomas & Betts Corporation.
 - c. Walker Systems, Inc.; Wiremold Company (The).
 - d. Wiremold Company (The); Electrical Sales Division.
- B. Surface Nonmetallic Raceways: Two-piece construction, manufactured of rigid PVC compound with matte texture and manufacturer's standard color.
 - 1. Available Manufacturers:
 - a. Butler Manufacturing Co.; Walker Division.
 - b. Enduro Composite Systems.
 - c. Hubbell, Inc.; Wiring Device Division.
 - d. Lamson & Sessions; Carlon Electrical Products.

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- e. Panduit Corp.
 - f. Walker Systems, Inc.; Wiremold Company (The).
 - g. Wiremold Company (The); Electrical Sales Division.
- C. Types, sizes, and channels as indicated and required for each application, with fittings that match and mate with raceways.
- D. Provide raceway base, cover, base coupling, coupling covers, angle fittings, end caps at ends, and entrance end fittings. Provide divider wall throughout raceway. Provide device brackets and snap-on bezels at all devices shown on drawings. Provide blank covers at all non-used bezels.
- E. Provide raceway full length, mounted as per drawings or 6" above counters if height is not indicated, as shown on drawings. Provide elbows and raceway to 6 inches above ceiling if risers are indicated on the drawings.

2.7 BOXES, ENCLOSURES, AND CABINETS

- A. Available Manufacturers:
- 1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
 - 2. Emerson/General Signal; Appleton Electric Company.
 - 3. Erickson Electrical Equipment Co.
 - 4. Hoffman.
 - 5. Hubbell, Inc.; Killark Electric Manufacturing Co.
 - 6. O-Z/ Gedney; Unit of General Signal.
 - 7. RACO; Division of Hubbell, Inc.
 - 8. Stahlin
 - 9. Scott Fetzer Co.; Adalet-PLM Division.
 - 10. Spring City Electrical Manufacturing Co.
 - 11. Thomas & Betts Corporation.
 - 12. Walker Systems, Inc.; Wiremold Company (The).
 - 13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.
- B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover.
- D. Nonmetallic Outlet and Device Boxes: NEMA OS 2.
- E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- F. Cast-Metal Pull and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.
- G. 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.
- H. 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.

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2.8 FACTORY FINISHES

- A. Finish: For raceway, enclosure, or cabinet components, provide manufacturer's standard prime-coat finish ready for field painting.
- B. Finish: For raceway, enclosure, or cabinet components, provide manufacturer's standard paint applied to factory-assembled surface raceways, enclosures, and cabinets before shipping.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors:
 - 1. Exposed: Rigid steel or IMC.
 - 2. Concealed: Rigid steel or IMC.
 - 3. Underground Secondary, Single Run: PVC Schedule 40 with long radius elbows.
 - 4. Underground Secondary, Grouped: PVC Schedule 40 with long radius elbows.
 - 5. Underground Primary: PVC Schedule 80 with long radius elbows.
 - 6. Primary Risers: PVC Schedule 80. With long radius elbows.
 - 7. Underground Data: PVC Schedule 40 with long radius elbows.
 - 8. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFNC.
 - 9. Boxes and Enclosures: NEMA 250, Type 3R.
 - 10. Under Canopies: IMC with sealed fittings.
 - 11. Penetrations through exterior walls: RMC or IMC
 - 12. Embedded in Concrete: Only in Approved locations – wrapped RMC or IMC.
 - 13. Coastal or Corrosive Locations or where specifically indicated on drawings: ETL PVC-001 PVC-GRS
- B. Indoors:
 - 1. Exposed in Mechanical/Electrical/Unfinished Spaces: EMT.
 - 2. Exposed in Finished Spaces: Metal Surface Raceway painted/finished to match space finishes.
 - 3. Concealed: EMT.
 - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC; except use LFNC in damp or wet locations or with water equipment.
 - 5. Damp or Wet Locations: Sealed EMT with sealed fittings.
 - 6. Underfloor: Sealed EMT with sealed fittings or IMC.
 - 7. Boxes and Enclosures: NEMA 250, Type 1, except as follows:
 - a. Damp or Wet Locations: NEMA 250, Type 4, nonmetallic.
- C. Minimum Raceway Size: 1/2-inch for single 20A or less circuits; otherwise, 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
 - 1. Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

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2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings approved for use with that material. Patch all nicks and scrapes in PVC coating using the manufacturer's PVC touch up compound after installing conduits.
- E. Install nonferrous conduit or tubing for circuits operating above 60 Hz.
- F. Aluminum conduit will not be accepted on this project.

3.2 INSTALLATION

- A. Conduit Routing:
 1. All branch circuit conduit shall be run overhead unless specifically directed by the engineer.
 - a. Exceptions:
 - 1) Conduit to floor boxes.
 - 2) Conduit to locations otherwise inaccessible overhead (exposed or not).
 - 3) Conduit to exterior slab locations without overhead cover.
 - 4) Conduit to column mounted lighting, devices, or equipment inaccessible from above.
 2. Panel feeder conduits may be run in the floor or underfloor ONLY IF indicated on the drawings or directed by the engineer.
 3. Service secondary conduits may be run underfloor or in-ground.
 4. Conduit for exterior equipment or lighting may be run underfloor or in-ground.
 5. All conduit serving any equipment or devices (to include panels, transformers, and switchboards, or any other electrical distribution equipment) within the perimeter of the building shall be run within the perimeter of the building. Conduit shall not run across courtyards or underground from one section of the building to another section of the contiguous building.
 - a. Exception: Service entrance conduit.
 6. All conduit shall be run at right angles or parallel to the building lines to the limits that the structure will allow. Raceways shall not be run diagonal or curved.
- B. Installation of the PVC Coated Conduit System shall be performed in accordance with the Manufacturer's Installation Manual. To assure correct installation, the installer shall be certified by Manufacturer to install coated conduit
- C. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- D. Install raceways as high as possible and coordinate installation with other equipment.
- E. Install raceways to equipment mounted on the floor away from walls from overhead down to the equipment or disconnects. Do not run across the floor creating a tripping hazard. Rack support conduit at the disconnect.
- F. Provide clear access to all pull and j-boxes. Provide access doors over hard (non-lay-in ceilings) to all pull boxes. Minimum access required 1.5 x box cover size or 18 inches.
- G. Label all j-box and pull box covers with circuits contained within box.
- H. Under no circumstances shall power and data be shared in the same raceway, tray, channel, or sleeve.

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- I. Install raceways for power conductors (any conductor over 50V) 12 inches from any signal/communications conductor (data, fiber optics, telephone, fire alarm, PA, community antenna and radio distribution (CATV), low power or network powered broadband communications, systems controls, and any other system operating under 50V) not in conduit on J-hooks.
- J. Install raceways for power conductors (any conductor over 50V) 12 inches from communications raceways. Communications raceways include; data, fiber optics, telephone, fire alarm, PA, community antenna and radio distribution (CATV), low power or network powered broadband communications, systems controls, and any other system operating under 50V.
 1. Exception: Data and power raceways shall be permitted to be 2 inches apart only at the wall drop to the devices. Above the ceiling or overhead the minimum 12 inch spacing shall be maintained.
 2. Exception: Within the surface raceways. When not within the surface raceway, the power and communications raceways shall be 12 inches apart.
 3. Underground: Data and power conduit/raceway shall be allowed in the same trench only if specifically allowed by the engineer and then there shall be a minimum of 12 inches of fill between the power and communications raceways. Magnetic marking tape shall be placed above the level of the highest (closest to grade) raceway.
- K. Exterior Exposed Raceways:
 1. See application schedule for raceway types.
 2. Provide non-flexible raceways through roofs to disconnects, panels, or receptacles as per application schedule.
 3. Provide transitions from non-flexible raceways to flexible raceways within 3 feet of the equipment.
 - a. Exception: Flexible raceways may exceed 3 feet only to accommodate the drip legs.
 4. Penetrate roofing membranes with approved methods only for the type of roof used. See roofing or architectural details.
 5. Provide chem-curbs on built-up roofs unless otherwise directed from roofing or architectural details.
 6. Support all exposed raceway on roofs with manufactured neoprene blocks with integral galvanized channel, conduit hangers as part of a manufactured assembly with galvanized channel (portable pipe hangers or equal), or approved method as per architectural.
 7. Exposed raceways on roofs shall not be unsupported in any areas nor attached directly to the roof.
 8. Provide roof hoods for multiple conduits through roofs as indicated.
 9. Provide drip legs for all exterior exposed raceways from disconnects to equipment.
- L. Buried Raceways:
 1. See application schedule for raceway types.
 2. Label all buried conduits.
 3. Provide spacers between all buried conduits for a neat and uniform installation. Conduit shall not be "stacked" on top of each other without manufactured spacers.
 4. IF telecommunications conduits and power conduits (only under 600V) are allowed in the same trench by owner or engineer, provide a minimum of 12 inches of compacted earth between the conduit racks. Provide magnetic marking tape between the communications conduits and the power conduits.

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5. Under NO circumstances shall power conduits over 600V be in the same trench as the communications conduits.
 6. All communications conduits shall have long radius elbows 10x the conduit diameter, but no less than 30", rising up into the building or communications equipment.
 7. Provide concrete encasement for all primary building feeders unless directed by utility company.
 8. Provide concrete encasement for all secondary building feeders unless otherwise noted.
 9. Provide pull strings/tape (per size and distance) for all empty conduits.
 10. Minimum depth of primary or medium voltage conduits 42 inches. (600V and above).
 11. Minimum depth of secondary or low voltage conduits 30 inches. (0 to 600V).
 12. All 90 degree changes in direction shall be long radius.
 13. Provide metal backed marking tape at 12 inches below grade and 6 inches above all buried raceways.
 14. Clean and swab out all conduits prior to installing conductors.
 15. Any metallic conduit coming in contact with earth, insulate with approved tape or asphalt paint.
- M. All underfloor conduits shall be supported as per NEC.
1. See application schedule for conduit types.
 2. All conduit supports shall be anchored to structure.
 3. Provide support for multiple conduits with galvanized kindorf rack, conduit straps, all thread rod to angles, and mount angles to structure.
 4. ONLY IF specifically directed by owner or engineer to use RNC underfloor;
 - a. Provide support for 2" and below conduit every 48 inches.
 - b. Provide support for 2-1/2" and above every 60 inches.
- N. Complete raceway installation before starting conductor installation.
- O. Support raceways as specified in Section "Basic Electrical Materials and Methods."
- P. Install temporary closures to prevent foreign matter from entering raceways during construction. Remove prior to completion of conduit.
- Q. Sleeves: Provide metallic raceway sleeves through walls or floors for all conductors/cabling not in raceways. Provide bushings at both ends of sleeves prior to installing any conductors or wiring. Firestop as per requirements.
- R. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portions of bends are not visible above the finished slab.
- S. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and keep straight legs of offsets parallel, unless otherwise indicated.
- T. Firestop: Firestop all raceway penetrations in rated walls. Provide intumescent fill in all sleeve openings. Contractor shall be responsible for all wall repair and damage. Excessive firestop for holes too large (1/2 inch beyond the edge of the raceway) is unacceptable. Holes shall be repaired with suitable wall materials to maintain the integrity of the wall construction.
- U. Cut openings in walls as per the outer edges of the raceway. Openings made with hammers or other wall damaging tools are not acceptable. Holes too large (1/2 inch beyond the edge of the raceway) are unacceptable and shall be repaired with suitable wall materials to maintain

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- the integrity of the wall construction. Contractor shall be responsible for repair to match existing.
- V. Provide manufactured elbows of conduit type specified for PVC raceways. Field constructed elbows are not allowed. Rigid Non-metallic tubing shall not have any field fabricated 90 degree bends. Provide manufactured elbows at all 90 degree changes in direction.
 - W. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
 - 1. Install concealed raceways with a minimum of bends in the shortest practical distance, considering type of building construction and obstructions, unless otherwise indicated.
 - X. Raceways Embedded in Slabs are allowed ONLY where specifically called out or ALLOWED by structural and electrical engineer: Install in middle one-third of slab thickness where practical and leave at least 2 inches of concrete cover on the top and bottom.
 - 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 raceways parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
 - Y. Expansion Joints: Provide flexible connections suitable for use with conduit type for all conduit in structural expansion joints or independent slabs that are within another structural assembly.
 - Z. Raceways Through Slabs to Interior Spaces: Install where practical and leave at least 2 inches from any walls unless required to come up in the wall. Coordinate with grade or perimeter beams prior to installation.
 - 1. Secure raceways to concrete with conduit clamps.
 - 2. Change from nonmetallic raceways to rigid steel conduit or IMC before rising above the floor.
 - a. Exception: Raceways from below grade into transformers and switchgear enclosures shall be RNC with bushings.
 - b. Exception: Raceways from below grade for telephone boards and data/signal equipment shall be RNC with bushings.
 - 3. Tape conduit from minimum 3 inches below transition to 3 inches above the floor so that no portion of the rigid steel conduit or IMC is in contact with the concrete.
 - AA. Raceways Through Floors: Install where practical and leave at least 2 inches from any walls. Coordinate with grade or perimeter beams prior to installation.
 - 1. Secure raceways to concrete with conduit clamps.
 - 2. Provide sleeve seals for conduit penetrations through floors. Provide firestopping at all floor penetrations.
 - BB. Install ALL exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.
 - 1. Run parallel or banked raceways together on common supports.
 - 2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.
 - 3. Install conduit as high as possible.
 - 4. Flexible cable or raceway for general circuiting is allowed exposed in mechanical or electrical spaces only. Not allowed in finished spaces.

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- a. Exception: As equipment connection only.
- CC. Join raceways with fittings designed and approved for that purpose and make joints tight.
 - 1. Use insulating bushings to protect conductors.
- DD. Tighten set screws of threadless fittings with suitable tools.
- EE. Terminations:
 - 1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.
 - 2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.
- FF. Install pull tape/wires in empty raceways.
 - 1. For raceways under 2 inches and under less than 100 feet, use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.
 - 2. Raceways under 2 inches and over 100 feet without intermediate pull boxes, provide mule tape. With intermediate pull boxes use pull wire.
 - 3. For raceways over 2 inches and use mule tape.
 - 4. Sleeves under 36 inches do not require pull tape/wire.
- GG. Telephone and Signal System Raceways, 2-Inch Trade Size and Smaller: In addition to above requirements, install raceways in maximum lengths of 150 feet 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.
- HH. Install raceway sealing 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. Label boxes "seal-off". Install raceway sealing fittings at the following points:
 - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - 2. Where otherwise required by NFPA 70.
- II. 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 finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches above the floor. Install screwdriver-operated, threaded plugs flush with floor for future equipment connections.
- JJ. Flexible Connections: Use maximum of 72 inches of flexible conduit for recessed and semi-recessed lighting fixtures if not using MC cable for lighting whips; for equipment subject to vibration, noise transmission, or movement, and for all motors indoors of non-water operating equipment. Use LFNC in damp or wet locations or to any water operating equipment. Install separate ground conductor across flexible connections.
- KK. Prime and Paint exposed conduit in finished spaces, unless pre-painted surface raceways is provided, as per owner/architect. Provide with paintable surface.

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LL. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying raceways to receptacle or fixture ground terminals.

MM. Floor Boxes:

1. Set floor boxes level. Grout around floor box to fill in area around box opening.
2. Trim after installation to fit flush with finished floor surface.
3. Ground floor box with circuit grounding conductor.
4. Coordinate covers with floor finishes. Provide covers with inserts for tile or carpet.
5. Floor boxes shall be flush with finish floor.

NN. Install hinged-cover enclosures and cabinets plumb. Support at each corner.

OO. Cap all un-used/spare conduits. Does not include sleeves.

3.3 PROTECTION

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at 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. Provide cover over conduits during storage to prevent dirt and debris from entering conduits during storage.

3.4 CLEANING

A. After completing installation of exposed, factory-finished raceways and boxes, inspect exposed finishes and repair damaged finishes.

B. Remove debris from conduits prior to capping any spare conduits.

C. Blow-out empty conduits that are future spares in any exterior or underground installation prior to capping.

3.5 RECORD

A. Record the location of all spare conduits buried for future use by the owner.

END OF SECTION 260533

SECTION 260553
ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes electrical identification materials and devices required to comply with ANSI C2, NFPA 70, OSHA standards, and authorities having jurisdiction.

1.3 SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Schedule of Nomenclature: An index of electrical equipment and system components used in identification signs and labels.
- C. Samples: For each type of label and sign to illustrate color, lettering style, and graphic features of identification products.

1.4 QUALITY ASSURANCE

- A. Comply with ANSI C2.
- B. Comply with NFPA 70.
- C. Comply with ANSI A13.1 and NFPA 70 for color-coding.

PART 2 - PRODUCTS

2.1 RACEWAYS AND CABLE LABELS

- A. Comply with ANSI A13.1, Table 3, for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
 - 1. Color: Black letters on orange field.
 - 2. Legend: Indicates voltage and service.
- B. Adhesive Labels: Preprinted, flexible, self-adhesive vinyl with legend overlaminated with a clear, weather- and chemical-resistant coating.

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- C. Pretensioned, Wraparound Plastic Sleeves: Flexible, preprinted, color-coded, acrylic band sized to suit the diameter of the line it identifies and arranged to stay in place by pretensioned gripping action when placed in position.
- D. Colored Adhesive Tape: Self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.
- E. Underground-Line Warning Tape: Permanent, bright-colored, continuous-printed, vinyl tape.
 - 1. Not less than 6 inches wide by 4 mils thick.
 - 2. Compounded for permanent direct-burial service.
 - 3. Embedded continuous metallic strip or core.
 - 4. Printed legend indicating type of underground line.
- F. Tape Markers: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.
- G. Aluminum, Wraparound Marker Bands: Bands cut from 0.014-inch- thick aluminum sheet, with stamped or embossed legend, and fitted with slots or ears for permanently securing around wire or cable jacket or around groups of conductors.
- H. Plasticized Card-Stock Tags: Vinyl cloth with preprinted and field-printed legends. Orange background, unless otherwise indicated, with eyelet for fastener.
- I. Aluminum-Faced, Card-Stock Tags: Weather-resistant, 18-point minimum card stock faced on both sides with embossable aluminum sheet, 0.002 inch thick, laminated with moisture-resistant acrylic adhesive, punched for fasteners, and preprinted with legends to suit each application.
- J. Brass or Aluminum Tags: 2×2×0.05-inch metal tags with stamped legend, punched for fastener.

2.2 NAMEPLATES AND SIGNS

- A. Safety signs: Comply with 29 CFR, Chapter XVII, Part 1910.145.
- B. Engraved Plastic Nameplates and Signs: Engraving stock, melamine plastic laminate, minimum 1/16 inch thick for signs up to 20 sq. in. and 1/8 inch thick for larger sizes.
 - 1. Engraved legend with black letters on white face.
 - 2. Punched or drilled for mechanical fasteners.
- C. Baked-Enamel Signs for Interior Use: Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for the application. ¼-inch grommets in corners for mounting.
- D. Exterior, Metal-Backed, Butyrate Signs: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for the application. ¼-inch grommets in corners for mounting.
- E. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32, stainless-steel machine screws with nuts and flat and lock washers.

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2.3 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Cable Ties: fungus-inert, self-extinguishing, one-piece, self-locking, Type 6/6 nylon cable ties.
 - 1. Minimum Width: 3/16 inch.
 - 2. Tensile Strength: 50 lb minimum.
 - 3. Temperature Range: Minus 40 to plus 185 deg F.
 - 4. Color: According to color-coding.

- B. Paint: Formulated for the type of surface and intended use.
 - 1. Primer for Galvanized Metal: Single-component acrylic vehicle formulated for galvanized surfaces.
 - 2. Primer for Concrete Masonry Units: Heavy-duty-resin block filler.
 - 3. Primer for Concrete: Clear, alkali-resistant, binder-type sealer.
 - 4. Enamel: Silicone-alkyd or alkyd urethane as recommended by primer manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Identification Materials and Devices: Install at locations for most convenient viewing without interference with operation and maintenance of equipment.

- B. Lettering, Colors, and Graphics: Coordinate names, abbreviations, colors, and other designations with corresponding designations in the Contract Documents or with those required by codes and standards. Use consistent designations throughout Project.

- C. Sequence of Work: If identification is applied to surfaces that require finish, install identification after completing finish work.

- D. Self-Adhesive Identification Products: Clean surfaces before applying.

- E. Install painted identification according to manufacturer's written instructions and as follows:
 - 1. Clean surfaces of dust, loose material, and oily films before painting.
 - 2. Prime surfaces using type of primer specified for surface.
 - 3. Apply one intermediate and one finish coat of enamel.

- F. Color Banding Raceways and Exposed Cables: Band exposed and accessible raceways of the systems listed below:
 - 1. Bands: Pretensioned, wraparound plastic sleeves; colored adhesive tape; or a combination of both. Make each color band 2 inches 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 maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
 - 3. Apply the following colors to the systems listed below:
 - a. Fire Alarm System: Red.
 - b. Fire-Suppression Supervisory and Control System: Red and yellow.
 - c. Combined Fire Alarm and Security System: Red and blue.
 - d. Security System: Blue and yellow.
 - e. Mechanical and Electrical Supervisory System: Green and blue.

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- f. Telecommunication System: Green and yellow.

- G. Caution Labels for Indoor Boxes and Enclosures for Power and Lighting: Install pressure-sensitive, self-adhesive labels identifying system voltage with black letters on orange background. Install on exterior of door or cover.

- H. Circuit Identification Labels on Boxes: Install labels externally.
 - 1. Exposed Boxes: Pressure-sensitive, self-adhesive plastic label on cover.
 - 2. Concealed Boxes: Plasticized card-stock tags.
 - 3. Labeling Legend: Permanent, waterproof listing of panel and circuit number or equivalent.
 - 4. Normal Power Circuits: Black lettering and numbers
 - 5. Emergency Power Circuits: Red lettering and numbers

- I. Paths of Underground Electrical Lines: During trench backfilling, for exterior underground power, control, signal, and communication lines, install continuous underground plastic line marker located directly above line at 6 to 8 inches below finished grade. Where width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches overall, use a single line marker. Install line marker for underground wiring, both direct-buried cables and cables in raceway.

- J. Color-Coding of Secondary Branch Circuit Conductors: Use the following colors for service, feeder, and branch-circuit branch circuit conductors:
 - 1. 120/208V 3 Phase Conductors:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Phase C: Blue.
 - d. Neutral: White.
 - e. Ground: Green.
 - 2. 120/240V 3 Phase Conductors:
 - a. Phase A: Black.
 - b. Phase B: Orange (High Leg Only).
 - c. Phase C: Blue.
 - d. Neutral: White.
 - e. Ground: Green.
 - 3. 120/240V Single Phase Conductors:
 - a. Phase A: Black.
 - b. Phase B: Red or Blue.
 - c. Neutral: White.
 - d. Ground: Green.
 - 4. 277/480V 3 Phase Conductors:
 - a. Phase A: Purple.
 - b. Phase B: Brown.
 - c. Phase C: Yellow.
 - d. Neutral: Gray.
 - e. Ground: Green.
 - 5. Factory apply color the entire length of conductors, except the following field-applied, color-coding methods may be used instead of factory-coded wire for sizes larger than No. 10 AWG:
 - a. Colored, pressure-sensitive plastic tape in half-lapped turns for a distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent

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- possible unwinding. Use 1-inch-wide tape in colors specified. Adjust tape bands to avoid obscuring cable identification markings.
- b. Colored cable ties applied in groups of three ties of specified color to each wire at each terminal or splice point starting 3 inches from the terminal and spaced 3 inches apart. Apply with a special tool or pliers, tighten to a snug fit, and cut off excess length.
- K. Power-Circuit Identification: Metal tags or aluminum, wraparound marker bands for cables, feeders, and power circuits in vaults, pull and junction boxes, manholes, and switchboard rooms.
1. Legend: ¼-inch- steel letter and number stamping or embossing with legend corresponding to indicated circuit designations.
 2. Tag Fasteners: Nylon cable ties.
 3. Band Fasteners: Integral ears.
- L. Apply identification to conductors as follows:
1. Conductors to Be Extended in the Future: Indicate source and circuit numbers.
 2. Multiple Power or Lighting Circuits in the Same Enclosure: Identify each conductor with source, voltage, circuit number, and phase. Use color-coding to identify circuits' voltage and phase.
 3. Multiple Control and Communication Circuits in the Same Enclosure: Identify each conductor by its system and circuit designation. Use a consistent system of tags, color-coding, or cable marking tape.
- M. Apply warning, caution, and instruction signs as follows:
1. Warnings, Cautions, and Instructions: Install 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.
 2. Emergency Operation: Install engraved laminated signs with white legend on red background with minimum 3/8-inch- high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.
- N. Equipment Identification Labels: Engraved plastic laminate. Install on each unit of equipment, including central or master unit of each system. This includes power, lighting, communication, signal, and alarm systems, unless units are specified with their own self-explanatory identification. Unless otherwise indicated, provide a single line of text with ½-inch- high lettering on 1½-inch-high label; where two lines of text are required, use labels 2 inches high. Use white lettering on black field. Apply labels for each unit of the following categories of equipment using mechanical fasteners:
1. Panelboards, electrical cabinets, and enclosures.
 2. Access doors and panels for concealed electrical items.
 3. Electrical switchgear and switchboards.
 4. Electrical substations.
 5. Emergency system boxes and enclosures.
 6. Motor-control centers.
 7. Disconnect switches.
 8. Enclosed circuit breakers.
 9. Motor starters.
 10. Push-button stations.
 11. Power transfer equipment.

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12. Contactors.
13. Remote-controlled switches.
14. Dimmers.
15. Control devices.
16. Transformers.
17. Inverters.
18. Rectifiers.
19. Frequency converters.
20. Battery racks.
21. Power-generating units.
22. Telephone switching equipment.
23. Clock/program master equipment.
24. Call system master station.
25. TV/audio-monitoring master station.
26. Fire alarm master station or control panel.
27. Security-monitoring master station or control panel.

END OF SECTION 260553

SECTION 261210

CONTROL/SIGNAL TRANSMISSION MEDIA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following types of control and signal transmission media: Twisted-pair cable used for security, access control, building management systems, sound, intercom, or any Non-IT/Voice/Data Control.
- B. Related Sections include the following:
 - 1. Section "Basic Electrical Materials and Methods" for building wire used for control or signal circuits.
 - 2. Section "Conductors and Cables" for building wire.
 - 3. Section "Raceways and Boxes."

1.3 DEFINITIONS

- A. PTFE: Polytetrafluoroethylene.

1.4 SUBMITTALS

- A. Product Data: For control/signal transmission media.
- B. Product Certificates: Signed by manufacturers of transmission media certifying that the products furnished comply with requirements and that they have been coordinated with and accepted by manufacturer of connected equipment.
- C. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
- D. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
- E. Maintenance Data: For transmission media to include in the maintenance manuals specified in Division 1.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain all cable of each type through one source from a single manufacturer.

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- B. Listing and Labeling: Provide products specified in this Section that are listed and labeled.
 - 1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.

- C. Comply with NFPA 70.

1.6 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect at least two (2) days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.

1.7 COORDINATION

- A. Coordinate with and obtain review of cable characteristics and certification for use with the connected system equipment by the connected equipment manufacturers.

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:
 - 1. Electronic Cables:
 - a. American Insulated Wire Corp.
 - b. AT&T Technology, Inc.; Cable and Wire Division.
 - c. Berk-Tek, Inc.
 - d. BICC Brand-Rex Company.
 - e. Cooper Industries; Belden Division.
 - f. Guardian Products; General Cable.
 - g. Mohawk Wire and Cable Corp.
 - h. Pirelli Cable Corp.; Power Cable Division.
 - 2. Optical Fiber Cables:
 - a. AT&T Technology, Inc.; Cable and Wire Division.
 - b. BICC Brand-Rex Company.
 - c. Cooper Industries; Belden Division.
 - d. Mohawk Wire and Cable Corp.
 - e. Optical Cable Corp.
 - f. Pirelli Cable Corp.; Power Cable Division.
 - g. Siecor Corp.

2.2 ELECTRONIC CABLE

- A. Provide cabling as indicated per manufacturer's installation instructions and as indicated below.
- B. Twisted-Pair Plenum:
 - 1. Quantity of twisted pairs indicated;

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2. No. 24 AWG, 7-strand, tinned-copper conductors; PTFE insulation; overall aluminum/polyester shield; No. 22 AWG tinned-copper drain wire; PTFE jacket; suitable for use in air-handling spaces.
- C. Control cabling. Provide cabling as indicated by manufacturer. Minimum Cat 5e. Cabling shall be:
1. Plenum rated.
 2. Color coded per drawings or specifications. Cabling shall not be the same color as data or telephone cabling.
 3. Copper Cable:
 - a. Conductors are twisted in pairs with four pairs contained in a flame retardant PVC jacket separated by a spline.
 - b. Superior performance exceeds all TIA/EIA-568-B Category 5 and ISO 11801 Edition 2.0 for Class E cable requirements. ETL tested and verified for Category 5E component performance.
 - c. Performance tested to 500 MHz.
 - d. Plenum (CMP) flame rated.
 4. Fiber Optics:
 - a. Optical Fiber Cable: Indoor Outdoor All Dielectric Cable or warranty approved Equal:
 - 1) All dielectric construction with no metallic elements.
 - 2) UV resistant cable sheathing.
 - 3) Indoor/Outdoor air handling space plenum rated.
 - 4) Sheath markings for positive identification and length verification.
 - 5) Flexible Buffer tube. Does not require innerduct.
 - 6) Multi-mode 62.5 micron. 10 Gb/s rated. Provide number of strands per application. Minimum 2.
 - b. Building Connector Optical Fiber Cable: Indoor/Outdoor Interlocking Armor Clad Cable or warranty approved Equal.
 - 1) Aluminum Interlocking Armor.
 - 2) Indoor/Outdoor air handling space plenum rated.
 - 3) UV resistant cable sheath.
 - 4) Dry Water block. No gel.
 - 5) Multi-mode 62.5 micron. 10 Gb/s rated. Provide number of strands per application, minimum 6.
 - 6) Sheath markings for positive identification and length verification.
- D. Cable shall be rated for indoor and outdoor use if located outside the building conditioned space. (Underfloor or buried is outside conditioned space)
- E. Control cabinet data cabling. Provide cabling as indicated by manufacturer or minimum cat 5e between control cabinets and devices within cabinet.
1. Plenum rated.
 2. Color-coded per drawings or specifications.

PART 3 - EXECUTION

3.1 EXAMINATION

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- A. Examine raceways and other elements to receive cables for compliance with requirements for installation tolerances and other conditions affecting performance of transmission media. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install cable as indicated, according to manufacturer's written instructions.
- B. Install transmission media without damaging conductors, shield, or jacket.
 - 1. Do not bend cable, in handling or installation, to smaller radii than minimum recommended by manufacturer.
 - 2. All new installation cabling shall be one piece without breaks or splices except at device connections.
 - 3. Existing cabling extended or relocated from an existing point shall be spliced per manufacturer installation instructions. If there are no manufacturers splicing instructions, provide compression butt splices and plenum rated sleeves suitable for use with the cabling jacket.
 - a. Use splice and tap connectors compatible with cable material.
 - b. Make no splices except at indicated splice points.
- C. Pull cables without exceeding cable manufacturer's recommended pulling tensions.
 - 1. Pull cables simultaneously if more than one is being installed in same raceway.
 - 2. Use pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation.
 - 3. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage media or raceway.
 - 4. Provide pull boxes as per NEC.
 - 5. Provide junction or pull boxes at all splice points.
- D. Install exposed cables parallel and perpendicular to surfaces or exposed structural members, and follow surface contours where possible.
- E. Support cables according to Section "Basic Electrical Materials and Methods."
- F. Seal around cables penetrating fire-rated elements according to Section "Firestopping."
- G. Bond shields and drain conductors to ground at only one point in each circuit.
- H. Connect components to wiring system and to ground as indicated and instructed by manufacturer.
- I. 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.
- J. Identify cables according to Section "Electrical Identification."
- K. Provide 24" service loops coiled every 100'. Velcro strap cabling together. Do not damage cabling by overtightening ties. If the cabling is deformed, replace the cable.

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- L. Mount on J-hooks when not in conduit independent of other systems. Secure to J-hooks with zip ties. Provide conduit or J-hooks separate from tele/data or security cabling. Do not tie to ceiling supports or any other non-structural support above ceiling.
- M. Install in conduit in all exposed or non-continuous ceilings or any finished space where cabling is visible and all unfinished areas below 10' AFF. See Raceways and Boxes application schedule for conduit types.
- N. Coordinate with owner for connector equipment type.

3.3 FIELD QUALITY CONTROL

- A. Copper Cable Testing Procedures: Inspect for physical damage and test cable for continuity and shorts. Use time-domain reflectometer with strip-chart recording capability and anomaly resolution to within 12 inches in runs up to 1000 feet in length. Test cable segments for faulty connectors, splices, terminations, and the integrity of the cable and its component parts.
- B. Replace malfunctioning cables at Project site, where possible, and retest to demonstrate compliance.
- C. Provide written documentation to the owner's representative of cabling performance.

END OF SECTION 261210

SECTION 261310
PULL AND JUNCTION BOXES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work covered by this Section includes furnishing of and paying for all materials, labor, services, equipment, licenses, taxes, other items, and appliances necessary for the execution, installation and completion of all work specified herein and/or shown on the drawings.
- B. Pull and junction boxes of appropriate size and depth as indicated on the drawings and as specified hereinafter.

1.2 SUBMITTALS

- A. Submittals for products furnished under this section are not required.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. For interior work, provide galvanized sheet metal boxes of code thickness with lapped and welded joints, 3/4-inch flanges, screw covers, etc.
- B. For exterior work, provide galvanized sheet metal boxes of code thickness with lapped and welded joints, 3/4-inch flanges, bolted covers with full gaskets forming a completely raintight assembly for above ground installations. Provide concrete boxes with screw fittings and drains for in ground pull boxes. Boxes shall be sized as per NEC or as indicated on the drawings.
- C. See drawings for pull boxes requiring racks.
- D. Boxes with concentric knockouts are not acceptable.
- E. Provide ground terminal strip and ground pull box and circuits.
- F. As shown on Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

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- A. Provide junction boxes as shown on drawings and otherwise where required, sized according to number of conductors in box or type of service to be provided. Minimum junction box size 4 inches square and 2 $\frac{1}{8}$ inches deep. Provide screw covers for junction boxes.
- B. Use minimum 16-gauge steel for pull boxes and provide with screw cover.
- C. Install boxes in conduit runs wherever necessary to avoid too long runs or too many bends. Do not exceed 100-foot runs without pull boxes.
- D. Rigidly secure boxes to walls or ceilings. Conduit runs will not be considered adequate support.
- E. Install boxes with covers in accessible locations.
- F. Observe maximum conductor fill as required by the National Electrical Code.

END OF SECTION 261310

SECTION 262310

PACKAGED ENGINE GENERATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes packaged diesel-engine generator sets with the following features and accessories:
 - 1. Battery charger.
 - 2. Day tank.
 - 3. Engine generator set.
 - 4. Muffler.
 - 5. Exhaust piping external to set.
 - 6. Outdoor enclosure.
 - 7. Remote annunciator.
 - 8. Starting battery.
- B. Related Sections include "Transfer Switches" for transfer switches, including sensors and relays to initiate automatic-starting and -stopping signals for engine generator sets.

1.3 DEFINITIONS

- A. Standby Rating: Power output rating equal to the power the generator set delivers continuously under normally varying load factors for the duration of a power outage.
- B. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.
- C. Steady-State Voltage Modulation: The uniform cyclical variation of voltage within the operational bandwidth, expressed in Hertz or cycles per second.

1.4 SUBMITTALS

- A. Product Data: Include data on features, components, ratings, and performance. Include the following:
 - 1. Dimensioned outline plan and elevation drawings of engine generator set and other components specified.
 - 2. Thermal damage curve for generator.
 - 3. Time-current characteristic curves for generator protective device.
- B. Specification Compliance Review:

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1. Manufacturers and bidders must provide the consulting engineer with a Compliance Review of the Specifications and Addenda's. The Compliance Review shall be a paragraph-by-paragraph review of the Specifications and schedule with the following information; "C", "D", or "E" marked in the margin of the original Specifications and any subsequent Addenda's. If the manufacturer or bidder does not provide the Compliance Review to the engineer for review, with the submittal, the submittal will be subject to rejection as non-compliant.
 - a. "C" Comply with no exceptions.
 - b. "D" Comply with deviations. For each and every deviation, provide a numbered footnote with reasons for the proposed deviation and how the intent of the Specification can be satisfied.
 - c. "E" Exception, do not comply. For each and every exception, provide a numbered footnote with reasons and possible alternatives. Non-compliance with the specifications is grounds for rejection as unacceptable. A bid from any alternative or listed equipment manufacturer with any number of exceptions will be reason for rejection for non-compliance without further review.
 - d. Unless a deviation or exception is specifically noted in the Compliance Review, the manufacturer shall provide full compliance with entire specification. Deviations or exceptions taken in letters or cover letters in a bid document, subsidiary documents, by omission or by contradiction do not release the manufacturer or bidder from being in complete compliance, unless the exception or deviation has been specifically noted in the Compliance Review and approved by the consulting engineer.
 - e. Equipment manufacturers or bidders that do not meet the specifications thru the above process will be subject to rejection without further review.
- C. Shop Drawings: Indicate fabrication details, dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 1. Design Calculations: Signed and sealed by a qualified professional engineer. Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
 2. Vibration Isolation Base Details: Signed and sealed by a qualified professional engineer. Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include base weights.
 3. Wiring Diagrams: Detail wiring for power and control connections and differentiate between factory-installed and field-installed wiring.
- D. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
- E. Field Test and Observation Reports: Indicate and interpret test results and inspection records relative to compliance with performance requirements.
- F. Certified summary of prototype-unit test report.
- G. Certified Test Reports: For components and accessories that are equivalent, but not identical, to those tested on prototype unit.
- H. Certified Summary of Performance Tests: Demonstrate compliance with specified requirement to meet performance criteria for sensitive loads.
- I. Factory Test Reports: For units to be shipped for this Project, showing evidence of compliance with specified requirements.

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- J. Exhaust Emissions Test Report: To show compliance with applicable regulations.
- K. Sound or noise measurement test report.
- L. Certification of Torsional Vibration Compatibility: Comply with NFPA 110.
- M. Field test report of tests specified in Part 3.
- N. Maintenance Data: For each packaged engine generator and accessories to include in maintenance manuals specified in Division 1. Include the following:
 - 1. List of tools and replacement items recommended to be stored at the Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.
 - 2. Detail operating instructions for both normal and abnormal conditions.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Maintain a service center capable of emergency maintenance and repairs at the Project with eight hours' maximum response time.
- B. Source Limitations: Obtain packaged engine generator and auxiliary components specified in this Section through one source from a single manufacturer.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- D. Comply with NFPA 70.
- E. Comply with NFPA 99.
- F. Comply with NFPA 110 requirements for Level 1 emergency power supply system.
- G. Engine Exhaust Emissions: Comply with applicable state and local government requirements.
- H. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at adjacent property boundaries due to sound emitted by generator set including engine, engine exhaust, engine cooling-air intake and discharge, and other components of the installation.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver engine generator set and system components to their final locations in protective wrappings, containers, and other protection that will exclude dirt and moisture and prevent damage from construction operations. Remove protection only after equipment is safe from such hazards.

1.7 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in

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addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

- B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace packaged engine generator and auxiliary components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five (5) years from date of Substantial Completion.

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, the following:
 - 1. Caterpillar, Inc.; Engine Div.
 - 2. Onan Corp; Industrial Business Group.
 - 3. Kohler
 - 4. Other manufacturers to submit for prior approval prior to bid

2.2 ENGINE GENERATOR SET

- A. Furnish a coordinated assembly of compatible components.
- B. Output Connections: Three phase, four wire.
- C. Safety Standard: Comply with ASME B15.1.
- D. Nameplates: Each major system component is equipped with a conspicuous nameplate of component manufacturer. Nameplate identifies manufacturer of origin and address, and model and serial number of item.
- E. Limiting dimensions indicated for system components are not exceeded.
- F. Power Output Ratings: Nominal ratings as indicated, with capacity as required to operate as a unit as evidenced by records of prototype testing.
- G. Skid: Adequate strength and rigidity to maintain alignment of mounted components without depending on a concrete foundation. Skid is free from sharp edges and corners. Lifting attachments are arranged to facilitate lifting with slings without damaging any components.
- H. Rigging Diagram: Inscribed on a metal plate permanently attached to skid. Diagram indicates location and lifting capacity of each lifting attachment and location of center of gravity.

2.3 GENERATOR-SET PERFORMANCE FOR SENSITIVE LOADS

- A. Oversizing generator compared with the rated power output of the engine to meet performance requirements in paragraphs below is permissible.

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1. Nameplate Data for Oversized Generator: Show ratings required by the Contract Documents rather than ratings that would normally be applied to generator size installed.
- B. Steady-State Voltage Operational Bandwidth: 2 percent of rated output voltage from no load to full load.
- C. Steady-State Voltage Modulation Frequency: Less than 1 Hz.
- D. Transient Voltage Performance: Not more than 10 percent variation for 50 percent step-load increase or decrease. Voltage recovers to remain within the steady-state operating band within 0.5 second.
- E. Steady-State Frequency Operational Bandwidth: Plus or minus 0.25 percent of rated frequency from no load to full load.
- F. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there are no random speed variations outside the steady-state operational band and no hunting or surging of speed.
- G. Transient Frequency Performance: Less than 2-Hz variation for a 50 percent step-load increase or decrease. Frequency recovers to remain within the steady-state operating band within three seconds.
- H. Output Waveform: At no load, harmonic content measured line to neutral does not exceed 2 percent total with no slot ripple. The telephone influence factor, determined according to NEMA MG 1, shall not exceed 50.
- I. Sustained Short-Circuit Current: For a three-phase, bolted short circuit at system output terminals, the system will supply a minimum of 300 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to winding insulation or any other generator system component.
- J. Excitation System: Performance is unaffected by voltage distortion caused by nonlinear load.
- K. Start Time: Comply with NFPA 110, Type 10, system requirements.

2.4 SERVICE CONDITIONS

- A. Environmental Conditions: Engine generator system withstands the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
 1. Ambient Temperature: Minus 15 to plus 40 deg C.
 2. Relative Humidity: 0 to 95 percent.
 3. Altitude: Sea level to 1000 feet.

2.5 ENGINE

- A. Comply with NFPA 37.
- B. Fuel: Fuel oil, Grade DF-2.

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- C. Rated Engine Speed: 1800 rpm.
- D. Maximum Piston Speed for Four-Cycle Engines: 2250 fpm.
- E. Lubrication System: Pressurized by a positive-displacement pump driven from engine crankshaft. The following items are mounted on engine or skid:
 - 1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.
 - 2. Thermostatic Control Valve: Controls flow in system to maintain optimum oil temperature. Unit is capable of full flow and is designed to be fail-safe.
 - 3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps or siphons or special tools or appliances.
- F. Engine Fuel System: Comply with NFPA 37. System includes the following:
 - 1. Main Fuel Pump: Mounted on engine. Pump ensures adequate primary fuel flow under starting and load conditions.
 - 2. Relief/ Bypass Valve: Automatically regulates pressure in fuel line and returns excess fuel to source.
- G. Coolant Jacket Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 1 equipment.

2.6 GOVERNOR

- A. Type: Adjustable isochronous, with speed sensing with mechanical backup.

2.7 ENGINE COOLING SYSTEM

- A. Description: Closed loop, liquid cooled, with radiator factory mounted on engine generator-set skid and integral engine-driven coolant pump.
- B. Radiator: Rated for specified coolant.
- C. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
- D. Expansion Tank: Constructed of welded steel plate and equipped with gage glass and petcock.
- E. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
- F. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, ultraviolet-, and abrasion-resistant fabric.
 - 1. Rating: 50-psig maximum working pressure with 180 deg F coolant, and noncollapsible under vacuum.
 - 2. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.

2.8 FUEL SUPPLY SYSTEM

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- A. Comply with NFPA 30 and NFPA 37.
- B. Base-Mounted Fuel Oil Tank: Factory- installed and -piped, listed and labeled double wall sub-base fuel oil tank. Features include the following:
 - 1. Tank level indicator.
 - 2. Capacity: Fuel for twelve hours' continuous operation at 100 percent rated power output.
 - 3. Vandal-resistant fill cap.
 - 4. Containment Provisions: Comply with requirements of authorities having jurisdiction.
 - 5. Dual- wall construction.
 - 6. Base Tank: Provide fuel tank switches for pump control with on/off alarms for low fuel, tank rupture and hi/low level.
 - 7. The tank shall have an adjustable float switch which will signal with contact closure for low fuel with tank vent. Provide leak detection with indicator. Fuel coolers are not acceptable.
- C. Fuel system shall include engine driven transfer pump, fuel filters, supply and return lines from the engine to the base mounted tank with adjustable float assembly.

2.9 ENGINE EXHAUST SYSTEM

- A. Muffler: Critical type, sized as recommended by engine manufacturer. Measured sound level at a distance of 10 feet from exhaust discharge, is 85 dBA or less. Provide manufactures rain caps compatible with exhaust design. Stainless steel from engine to muffler.

2.10 COMBUSTION-AIR-INTAKE

- A. Description: Heavy-duty engine-mounted air cleaner with replaceable dry filter element and "blocked filter" indicator.

2.11 STARTING SYSTEM

- A. Description: 24-V electric, with negative ground and including the following items:
 - 1. Components: Sized so they will not be damaged during a full engine-cranking cycle with ambient temperature at maximum specified in "Environmental Conditions" Paragraph in "Service Conditions" Article above.
 - 2. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
 - 3. Cranking Cycle: As required by NFPA 110 for system level specified.
 - 4. Battery: Adequate capacity within ambient temperature range specified in "Environmental Conditions" Paragraph in "Service Conditions" Article above to provide specified cranking cycle at least three times without recharging.
 - 5. Battery Cable: Size as recommended by generator set manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.
 - 6. Battery Compartment: Factory fabricated of metal with acid-resistant finish and thermal insulation. Thermostatically controlled heater is arranged to maintain battery above 10 deg C regardless of external ambient temperature within range specified in "Environmental Conditions" Paragraph in "Service Conditions" Article above. Include accessories required to support and fasten batteries in place.

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7. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35-A minimum continuous rating.
8. Battery Charger: Current-limiting, automatic-equalizing and float-charging type. Unit complies with UL 1236 and includes the following features:
 - a. Operation: Equalizing-charging rate of 10 A is initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit then automatically switches to a lower float-charging mode and continues operating in that mode until battery is discharged again.
 - b. Automatic Temperature Compensation: Adjusts float and equalizes voltages for variations in ambient temperature from minus 40 deg C to plus 60 deg C to prevent overcharging at high temperatures and undercharging at low temperatures.
 - c. Automatic Voltage Regulation: Maintains output voltage constant regardless of input voltage variations up to plus or minus 10 percent.
 - d. Ammeter and Voltmeter: Flush mounted in door. Meters indicate charging rates.
 - e. Safety Functions: Include sensing of abnormally low battery voltage arranged to close contacts providing low battery voltage indication on control and monitoring panel. Also include sensing of high battery voltage and loss of ac input or dc output of battery charger. Either condition closes contacts that provide a battery-charger malfunction indication at system control and monitoring panel.
 - f. Enclosure and Mounting: NEMA 250, Type 1, wall-mounted cabinet.

2.12 CONTROL AND MONITORING

- A. Functional Description: When the mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic-transfer switches initiate starting and stopping of the generator set. When the mode-selector switch is switched to the on position, the generator set manually starts. The off position of the same switch initiates generator-set shutdown. When the generator set is running, specified system or equipment failures or derangements automatically shut down the generator set and initiate alarms. Operation of a remote emergency-stop switch also shuts down the generator set.
- B. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages are grouped on a common control and monitoring panel mounted on the generator set. Mounting method isolates the control panel from generator-set vibration.
- C. Indicating and Protective Devices and Controls: Include those required by NFPA 110 for a Level 1 system, and the following:
 1. AC voltmeter.
 2. AC ammeter.
 3. AC frequency meter.
 4. DC voltmeter (alternator battery charging).
 5. Engine-coolant temperature gage.
 6. Engine lubricating-oil pressure gage.
 7. Running-time meter.
 8. Ammeter-voltmeter, phase-selector switch(es).
 9. Generator-voltage adjusting rheostat.
 10. Start-stop switch.
 11. Overspeed shutdown device.
 12. Coolant high-temperature shutdown device.
 13. Coolant low-level shutdown device.
 14. Oil low-pressure shutdown device.

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15. Fuel tank derangement alarm.
 16. Fuel tank high-level shutdown of fuel supply alarm.
 17. Generator overload.
- D. Supporting Items: Include sensors, transducers, terminals, relays, and other devices, and wiring required to support specified items. Locate sensors and other supporting items on engine, generator, or elsewhere as indicated. Where not indicated, locate to suit manufacturer's standard.
- E. Connection to Data Link: A separate terminal block, factory wired to Form C dry contacts, for each alarm and status indication is reserved for connections for data link transmission of indications to remote data terminals. Data system connections to terminals are covered in another Section.
- F. Common Remote Audible Alarm: Comply with NFPA 110 requirements for Level 1 systems. Include necessary contacts and terminals in control and monitoring panel. Locate audible device and silencing means where indicated.
- G. Remote Alarm Annunciator: Comply with NFPA 99. Labeled LEDs identify each alarm event. Common audible signal sounds for alarm conditions. Silencing switch in face of panel silences signal without altering visual indication. Connect so that after an alarm is silenced, clearing of initiating condition will reactivate alarm until silencing switch is reset. Cabinet and faceplate are surface- or flush-mounting type to suit mounting conditions indicated.
- H. Remote Emergency-Stop Switch: Flush wall-mounted, unless otherwise indicated and prominently labeled. Push button is protected from accidental operation.

2.13 GENERATOR OVERCURRENT AND FAULT PROTECTION

- A. Generator Circuit Breaker: Molded-case, thermal-magnetic type; 100 percent rated; complying with NEMA AB 1 and UL 489.
1. Tripping Characteristic: Designed specifically for generator protection.
 2. Trip Rating: Matched to generator rating.
 3. Shunt Trip: Connected to trip breaker when generator set is shut down by other protective devices.
 4. Mounting: Adjacent to or integrated with control and monitoring panel.
- B. Generator Protector: Microprocessor-based unit that continuously monitors current level in each phase of generator output, integrates generator heating effect over time, and predicts when thermal damage of the alternator will occur. When signaled by the protector or other generator-set protective devices, a shunt-trip device in the generator disconnect switch shall open the switch to disconnect the generator from the load circuits. Protector performs the following functions:
1. Initiates a generator overload alarm when the generator has operated at an overload equivalent to 110 percent of full-rated load for 60 seconds. Indication for this alarm is integrated with other generator-set malfunction alarms.
 2. Under single or three-phase fault conditions, regulates the generator to 300 percent of rated full-load current for up to 10 seconds.
 3. As heating effect on the generator of overcurrent approaches the thermal damage point of the unit, the protector switches the excitation system off, opens the generator disconnect switch, and shuts down the generator set.

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- 4. Senses clearing of a fault by other overcurrent devices and controls recovery of rated voltage to avoid overshoot.
- C. Ground-Fault Indication: Comply with NFPA 70, Article 700-7(d). Integrate ground-fault alarm indication with other generator-set alarm indications.

2.14 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

- A. Comply with NEMA MG 1 and specified performance requirements.
- B. Drive: Generator shaft is directly connected to engine shaft. Exciter is rotated integrally with generator rotor.
- C. Electrical Insulation: Class H or Class F.
- D. Stator--Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required.
- E. Construction prevents mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.
- F. Excitation uses no slip or collector rings, or brushes, and is arranged to sustain generator output under short-circuit conditions as specified.
- G. Enclosure: Drip-proof.
- H. Instrument Transformers: Mounted within generator enclosure.
- I. Voltage Regulator: Digital separate from exciter.
- J. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.
- K. Subtransient Reactance: 12 percent, maximum. Match pitch of gensets for parallel operation.

2.15 OUTDOOR GENERATOR-SET ENCLOSURE

- A. Description: Vandal-resistant, weatherproof steel housing, wind resistant up to 100 mph. Multiple panels are lockable and provide adequate access to components requiring maintenance. Panels are removable by one person without tools. Instruments and control are mounted within enclosure.
- B. Enclosure shall be sound attenuated (85 dBA @ 3 feet) type requiring no field modifications and shall be from the manufacturer.
- C. The enclosure shall be 14 gauge minimum formed construction with gasketed roof bolts.
- D. The roof shall be flanged rain tight construction complete with roof stiffeners. The doors shall be hinged removable with fixed open intake louvers and equipped with adjustable plated pad-type latches and matched keys and rubber door stops.

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- E. There shall be at least two side doors and one rear door for easy access. All doors shall be lockable.
- F. Complete enclosure shall be primed with zinc-chromate and finished painted.

2.16 FINISHES

- A. Outdoor Enclosures: Manufacturer's standard enamel over corrosion-resistant pretreatment and compatible standard primer.

2.17 SOURCE QUALITY CONTROL

- A. Factory Tests: Include prototype testing and Project-specific equipment testing (testing of equipment manufactured specifically for this Project).
- B. Prototype Testing: Performed on a separate engine generator set using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.
 - 1. Tests: Comply with those required for Level 1 energy converters in Paragraphs 3.2.1, 3.2.1.1, and 3.2.1.2 of NFPA 110.
 - 2. Generator Tests: Comply with IEEE 115.
 - 3. Components and Accessories: Items furnished with installed unit that are not identical to those on tested prototype have been tested to demonstrate compatibility and reliability.
- C. Project-Specific Equipment Tests: Factory test engine generator set and other system components and accessories before shipment. Perform tests at rated load and power factor. Include the following tests.
 - 1. Full load run.
 - 2. Maximum power.
 - 3. Voltage regulation.
 - 4. Transient and steady-state governing.
 - 5. Single-step load pickup.
 - 6. Safety shutdown.
- D. Observation of Factory Tests: Provide 14 days' advance notice of tests and opportunity for observation of test by Owner's representatives.
- E. Report factory test results within 10 days of completion of test.

2.18 ACCESSORIES

- A. Provide NEMA 3R duplex receptacle with cover mounted on the inside of the generator housing.
- B. Provide two (2) 120V wall-mounted vapor-proof clear glass cylinder fixtures ("Jelly Jars") switched from a NEMA 3R switch mounted on the inside of the generator enclosure. Power to the switch shall be in line from the receptacle feed. Fixtures shall illuminate the engine compartment.

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- C. Provide damp-location, high-capacity, 12V, 90-minute emergency light with test button and red LED indicator light mounted inside the generator enclosure. Emergency light shall be powered from receptacle circuit. Emergency light shall be 120V operation and shall not be switched. Fixture shall illuminate the engine compartment.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, equipment foundations, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine generator performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Examine roughing-in of cooling-system piping systems and electrical connections. Verify actual locations of connections before packaged engine generator installation.

3.2 CONCRETE BASES

- A. Install concrete bases of dimensions indicated for packaged engine generators. Refer to Division 3 Sections "Cast-in-Place Concrete," Concrete Formwork," and Concrete Reinforcement," and Section "Basic Electrical Materials and Methods."

3.3 INSTALLATION

- A. Comply with packaged engine generator manufacturers' written installation and alignment instructions, and with NFPA 110.
- B. Set packaged engine generator set on concrete bases.
 - 1. Support generator-set mounting feet on rectangular metal blocks and shims or on metal wedges having small taper, at points near foundation bolts to provide 3/4- to 1-1/2-inch gap between base and foundation for grouting.
 - 2. Adjust metal supports or wedges until generator is level.
- C. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.
- D. Provide no smoking signage per fire marshall.
- E. Provide engraved permanent placard on generator and matching building disconnect indicating; "Building disconnect 1 of 2" with location and designation of second disconnect. Provide placard on other disconnect with location and identification of genset
- F. Install cooling-system piping, accessories, hangers and supports, and anchors for complete installation.
 - 1. Extend drain piping from heat exchangers to point of disposition.
- G. Install exhaust-system piping for diesel engines. Extend to point of termination outside structure. Size piping according to manufacturer's written instructions.

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- H. Install condensate drain piping for diesel-engine exhaust system. Extend drain piping from low points of exhaust system and from muffler to condensate traps and to point of disposition.
- I. Install flow meters and sensors where indicated. Install flow-measuring system components and make connections according to manufacturer's written instructions.
- J. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.
 - 1. Verify that electrical wiring is installed according to manufacturers' submittal and installation requirements in Division 26 Sections. Proceed with equipment startup only after wiring installation is satisfactory.
- K. Install remote annunciator. Provide conduit and conductors from generator as per manufacturer's requirements. Install remote annunciator at building entrance provide 1 ½" conduit from genset to remote annunciator with manufacturers cable.
- L. Install remote emergency stop switch. Install on wall or rack across from generator in NEMA 3R enclosure with 8"x8" red plaque "Generator Emergency Stop" with cover. Emergency stop switch shall stop generator, not just disconnect power.

3.4 CONNECTIONS

- A. Piping installation requirements are specified in Division 22 and 23 Sections. Drawings indicate general arrangement of piping and specialties. The following are specific connection requirements:
 - 1. Install piping adjacent to packaged engine generator to allow service and maintenance.
 - 2. Connect water supply to cooling system.
 - 3. Connect cooling-system water supply and drain piping to diesel-engine heat exchangers. Install flexible connectors at connections to engine generator and remote radiator.
 - 4. Connect exhaust-system piping to diesel engines.
 - 5. Tank vent piping: Install black painted schedule 40 steel piping from diesel tank vent to 12' above grade with pipe vent rain cap per manufacturer. Provide galvanized pipe clamps, mount to genset.
- B. Electrical wiring and connections are specified in Division 26 Sections.
- C. Ground equipment.
 - 1. Tighten electrical connectors and terminals according to manufacturers published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.5 IDENTIFICATION

- A. Identify system components according to Section "Mechanical Identification" and Section "Electrical Identification."

3.6 FIELD QUALITY CONTROL

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- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including piping and electrical connections, and to assist in testing. Report results in writing.
- B. Testing: Perform field quality-control testing under the supervision of the manufacturer's factory-authorized service representative.
- C. Tests: Include the following:
 - 1. Tests recommended by manufacturer.
 - 2. International Electrical Testing Association Tests: Perform each visual and mechanical inspection and electrical and mechanical test stated in NETA ATS for emergency engine generator sets, except omit vibration baseline test. Certify compliance with test parameters for tests performed.
 - 3. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here including, but not limited to, the following:
 - a. Single-step full-load pickup test.
 - 4. Battery Tests: Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery. Verify acceptance of charge for each element of battery after discharge. Verify measurements are within manufacturer's specifications.
 - 5. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
 - 6. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine generator system before and during system operation. Check for air, exhaust, and fluid leaks.
 - 7. Exhaust-System Back-Pressure Test: Use a manometer with a scale exceeding 40 inches wg. Connect to exhaust line close to engine exhaust manifold. Verify that back pressure at full-rated load is within manufacturer's written allowable limits for the engine.
 - 8. Exhaust Emissions Test: Comply with applicable government test criteria.
 - 9. Load Bank Testing: Provide load bank testing of generator as per the following schedule:
 - a. Start generator and normalize voltage
 - b. Provide resistance load of intended building load (per load analysis) for 90 minutes
 - c. Provide resistance load of 100% of rated capacity for 120 minutes
 - d. Provide cool down period
 - e. Restart generator and normalize voltage
 - f. Provide resistance load to 30% of rated capacity for 30 minutes
 - g. Increase resistance load to 50% of rated capacity for 30 minutes
 - h. Increase resistance load to 100% of rated capacity for 60 minutes
 - i. Transfer back to normal power and perform shut down sequence
- D. Coordinate tests with tests for transfer switches and run them concurrently.
- E. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.

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- F. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.
- G. Test instruments shall have been calibrated within the last 12 months, traceable to standards of the National Institute for Standards and Technology, and adequate for making positive observation of test results. Make calibration records available for examination on request.

3.7 BATTERY EQUALIZATION

- A. Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.

3.8 CLEANING

- A. On completion of installation, inspect system components. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish. Clean components internally using methods and materials recommended by manufacturer.

3.9 DEMONSTRATION / TRAINING

- A. Engage a factory-authorized service representative from equipment supplier to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators as specified below:
 - 1. Coordinate this training with that for transfer switches.
 - 2. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment.
 - 3. Review data in maintenance manuals. Refer to Division 1 Section "Contract Closeout."
 - 4. Review data in maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data."
 - 5. Schedule training with Owner, through Architect/Project Manager, with at least fourteen (14) days' advance notice.
 - 6. Minimum Instruction Period: Four (4) hours.

3.10 TRAINING

- A. The equipment supplier shall provide training for the facility operating personnel covering operation and maintenance of the equipment provided. The training program shall be not less than 4 hours in duration and the class size shall be limited to 5 persons. Training date shall be coordinated with the facility owner.

3.11 SERVICE SUPPORT

- A. The manufacturer of the generator set shall maintain service parts inventory at a central location which is accessible to the service location 24 hours per day, 365 days per year.
- B. The generator set shall be serviced by local service organization that is trained and factory certified in generator set service. The supplier shall maintain an inventory of critical replacement parts at the local service organization, and in service vehicles. The service organization shall be on call 24 hours per day, 365 days per year.

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- C. The manufacturer shall maintain model and serial number records of each generator set provided for at least 20 years.

3.12 WARRANTY

- A. The generator set and associated equipment shall be warranted for a period of not less than 5 years from the date of commissioning against defects in materials and workmanship.
- B. The warranty shall be comprehensive. No deductibles shall be allowed for travel time, service hours, repair parts cost, etc.

END OF SECTION 262310

SECTION 262413

SWITCHBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes service and distribution switchboards and main breaker cabinets rated 600 V and less.
- B. Related Sections include Section “Fuses.”

1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter (GFI).
- C. RFI: Radio-frequency interference.
- D. RMS: Root mean square.
- E. SPDT: Single pole, double throw.
- F. TVSS: Transient voltage surge suppressor.

1.4 SUBMITTALS

- A. Product Data: For each type of switchboard, overcurrent protective device, TVSS device, ground-fault protector, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Specification Compliance Review:
 - 1. Manufacturers and bidders must provide the consulting engineer with a Compliance Review of the Specifications and Addenda's. The Compliance Review shall be a paragraph-by-paragraph review of the Specifications and schedule with the following information; “C”, “D”, or “E” marked in the margin of the original Specifications and any subsequent Addenda's. If the manufacturer or bidder does not provide the Compliance Review to the engineer for review, with the submittal, the submittal will be subject to rejection as non-compliant.
 - a. “C” Comply with no exceptions.

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- b. “D” Comply with deviations. For each and every deviation, provide a numbered footnote with reasons for the proposed deviation and how the intent of the Specification can be satisfied.
 - c. “E” Exception, do not comply. For each and every exception, provide a numbered footnote with reasons and possible alternatives. Non-compliance with the specifications is grounds for rejection as unacceptable. A bid from any alternative or listed equipment manufacturer with any number of exceptions will be reason for rejection for non-compliance without further review.
 - d. Unless a deviation or exception is specifically noted in the Compliance Review, the manufacturer shall provide full compliance with entire specification. Deviations or exceptions taken in letters or cover letters in a bid document, subsidiary documents, by omission or by contradiction do not release the manufacturer or bidder from being in complete compliance, unless the exception or deviation has been specifically noted in the Compliance Review and approved by the consulting engineer.
 - e. Equipment manufacturers or bidders that do not meet the specifications thru the above process will be subject to rejection without further review.
- C. Shop Drawings: For each switchboard and related equipment.
- 1. Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. 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 switchboards and overcurrent protective devices.
 - d. Descriptive documentation of optional barriers specified for electrical insulation and isolation.
 - e. Utility company's metering provisions with indication of approval by utility company.
 - f. Mimic-bus diagram.
 - g. UL listing for series rating of installed devices.
 - h. 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.
- D. Samples: Representative portion of mimic bus with specified finish, for color selection.
- E. Qualification Data: Submit data for testing agencies indicating that they comply with qualifications specified in “Quality Assurance” Article.
- F. 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.
- G. Manufacturer’s field service report.
- H. Updated mimic-bus diagram reflecting field changes after final switchboard load connections have been made, for record.

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- I. Maintenance Data: For switchboards and components to include in maintenance manuals specified in Division 1. In addition to requirements specified in Division 1 Section "Contract Closeout," include the following:
 1. Routine maintenance requirements for switchboards and all installed components.
 2. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
 3. Time-current curves, including selectable ranges for each type of overcurrent protective device.

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 NEMA PB 2.
- C. Comply with NFPA 70.
- D. Product Selection for Restricted Space: Drawings indicate maximum dimensions for switchboards, including clearances between switchboards, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver in sections of lengths that can be moved past obstructions in delivery path.
- B. Store indoors in clean dry space with uniform temperature to prevent condensation. Protect from exposure to dirt, fumes, water, corrosive substances, and physical damage.
- C. If stored in areas subjected to weather, cover switchboards to provide protection from weather, dirt, dust, corrosive substances, and physical damage. Remove loose packing and flammable materials from inside switchboards; install electric heating (250W per section) to prevent condensation.
- D. Handle switchboards according to NEMA PB 2.1.

1.7 PROJECT CONDITIONS

- A. Installation Pathway: Remove and replace access fencing, doors, lift-out panels, and structures to provide pathway for moving switchboards into place.
- B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 1. Notify Architect not less than seven days in advance of proposed utility interruptions. Identify extent and duration of utility interruptions.
 2. Indicate method of providing temporary utilities.
 3. Proceed with utility interruptions only after receiving Architect's written authorizations.

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- C. Environmental Limitations: Rate equipment for continuous operation under the following, unless otherwise indicated:
 - 1. Ambient Temperature: Not exceeding 104 deg F.
 - 2. Altitude: Not exceeding 6600 feet.
- D. Service Conditions: NEMA PB2, usual service conditions, as follows:
 - 1. Altitude not exceeding 6600 feet.
 - 2. Ambient temperatures within limits specified.

1.8 COORDINATION

- A. Coordinate layout and installation of switchboards and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section "Cast-in-Place Concrete."

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, the following:
 - 1. Siemens
 - 2. Eaton
 - 3. Square D Co.

2.2 MANUFACTURED UNITS

- A. Front-Accessible Switchboard: Front aligned, with features as follows:
 - 1. Main Devices: Standard front mount. Individual.
 - 2. Branch Devices: Group mounted. I-line.
- B. Nominal System Voltage: rated for 600 volts. See schedules and one lines for actual voltage.
- C. Main-Bus Continuous: See schedules and one-lines.
- D. Short Circuit Rating: 100,000 AIC minimum unless otherwise noted on the drawings.

2.3 FABRICATION AND FEATURES

- A. Enclosure: NEMA 250, Type 1.
- B. Enclosure Finish for Indoor Units: Factory-applied finish in manufacturer's standard gray finish over a rust-inhibiting primer on treated metal surface.
- C. Barriers: Between adjacent switchboard sections for fire pump feed sections only.

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- D. Insulation and isolation for main and vertical buses of feeder sections.
- E. Insulation and isolation for main bus of main section and main and vertical buses of feeder sections.
- F. Hinged Front Panels: Allow access to circuit-breaker, metering, accessory, and blank compartments.
- G. Buses and Connections: Three phase, four wire, unless otherwise indicated. Include the following features:
 - 1. Phase- and Neutral-Bus Material: Hard-drawn copper of 98 percent conductivity with copper feeder circuit-breaker line connections. Aluminum is **NOT** acceptable.
 - 2. Load Terminals: Insulated, rigidly braced, silver-plated, copper runback bus extensions equipped with pressure connectors for outgoing circuit conductors. Provide load terminals for future circuit-breaker positions at full ampere rating of circuit-breaker position.
 - 3. Ground Bus: ¼×2-inch minimum size, drawn-temper copper of 98 percent conductivity, equipped with pressure connectors for feeder and branch-circuit ground conductors. For busway feeders, extend insulated equipment grounding cable to busway ground connection and support cable at intervals in vertical run.
 - 4. Contact Surfaces of Buses: Silver plated.
 - 5. Main Phase Buses, Neutral Buses, and Equipment Ground Buses: Uniform capacity for entire length of switchboard's main and distribution sections. Provide for future extensions from both ends.
 - 6. Isolation Barrier Access Provisions: Permit checking of bus-bolt tightness.
 - 7. Neutral Buses: 100 percent of the ampacity of the phase buses, unless otherwise indicated, equipped with pressure connectors for outgoing circuit neutral cables. Neutral bus shall be capable of extension and braced for indicated fault current.
 - 8. Provide compression fittings.
 - 9. Lugs: Provide UL listed Nema wire size specific lugs. Custom lugs are not acceptable. Coordinate with electrical drawings. Lug material type shall match conductors.
 - 10. Bus mounting locations shall be wide enough to accommodate UL listed Nema size specific lugs with one extra predrilled lug space.
- H. Future Devices: Equip compartments with mounting brackets, supports, bus connections, and appurtenances at full rating of circuit-breaker compartment.
- I. Provide GFI digital or LCD fault code readout mounted on the front of NEMA 1 cabinets and inside door on NEMA 3R cabinets.
- J. Provide digital meter with real time displays of amperage and voltage per phase mounted on the front of NEMA 1 cabinets and inside door on NEMA 3R cabinets. Square D Powerlogic PM 820 or equivalent with Accessory Card for Ethernet and Modbus Communications.

2.4 TVSS DEVICES

- A. IEEE C62.41, integrally mounted, plug-in style, solid-state, parallel-connected, sine-wave tracking suppression and filtering modules.
- B. Minimum single-impulse current rating shall be as follows:
 - 1. Line to Neutral: 100,000 A.

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2. Line to Ground: 100,000 A.
 3. Neutral to Ground: 80,000 A.
- C. Protection modes shall be as follows:
1. Line to neutral.
 2. Line to ground.
 3. Neutral to ground.
- D. EMI/RFI Noise Attenuation Using 50-ohm Insertion Loss Test: 55 dB at 100 kHz.
- E. Category C combination wave clamping voltage shall not exceed 1000 V, line to neutral and line to ground on 277/480 V systems.
- F. UL 1449 clamping levels shall not exceed 800 V, line to neutral and line to ground on 277/480 V systems.
- G. Withstand Capabilities: 3000 Category C surges with less than 5 percent change in clamping voltage.
- H. Accessories shall include the following:
1. Form-C contacts, one normally open and one normally closed, for remote monitoring of system operation. Contacts to reverse position on failure of any surge diversion module.
 2. Audible alarm activated on failure of any surge diversion module.
 3. Six-digit transient-counter set to totalize transient surges that deviate from the sine-wave envelope by more than 125 V.

2.5 OVERCURRENT PROTECTIVE DEVICES

- A. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents. Breakers shall be fully rated for switchboard AIC rating.
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. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
 3. 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 I^2t response.
 4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
 5. 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.
 6. GFCI Circuit Breakers: Single- and two-pole configurations with 5-mA trip sensitivity.
- B. Molded-Case Circuit-Breaker Features and Accessories: Standard frame sizes, trip ratings, and number of poles.
1. Lugs: Compression style, suitable for number, size, trip ratings, and material of conductors.

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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.

2.6 IDENTIFICATION

- A. Provide a minimum 8x8" laminated engraved two color plaque displaying a concise visual presentation of principal switchboard components and connections. Diagram shall mimic switchboard Bus. Arrange in single-line diagram format, using symbols and letter designations consistent with final mimic-bus diagram. Coordinate mimic-bus segments with devices in switchboard sections to which applied. Painted graphics in color contrasting with equipment factory-finished background to represent bus and components, complete with lettered designations.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine elements and surfaces to receive switchboards for compliance with installation tolerances and other conditions affecting performance.
 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install switchboards and accessories according to NEMA PB 2.1.
- B. Support switchboards on concrete bases, 4-inch nominal thickness. Provide minimum 6 inches beyond switchboard for interior installation and 12 inches beyond switchboard for exterior installations. Bases shall be arranged in a pad configuration, curbs are not acceptable.
- C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from switchboard units and components.
- D. Operating Instructions: Frame and mount the printed basic operating instructions for switchboards, including control and key interlocking sequences and emergency procedures. Fabricate frame of finished metal and cover instructions with clear acrylic plastic. Mount on front of switchboards.
- E. Coordinate location of ductbank with structural or site conditions. Provide ductbank rough-in at base of switchboard. External pull boxes or j-boxes for conduit are not acceptable unless with written approval of the engineer. Under no circumstances shall the switchboard casing be cut to access the ductbank unless specific written approval from the engineer. Cutting or damaging the switchboard cabinet shall be grounds for replacement of the cut panels or complete replacement at the discretion of the engineer.
- F. Bolt the switchboard to the concrete base.

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- G. Provide 36" deep full width of switchboard pad concrete walkway in front of the switchboard for external installations. Coordinate concrete walk with equipment yard. Walkway shall be flush with finished grade.
- H. Set all adjustable breakers to the coordination settings or the factory technician settings.
- I. Adjust GFI trip settings based upon factory technician recommendations.
- J. Verify all trip settings prior to substantial completion or energizing.
- K. Coordinate trip settings of all breakers that feed transfer switching methods (ATS/motorized breakers) to match coordination study.

3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Section "Electrical Identification."
- B. Switchboard Nameplates: Label each switchboard compartment with engraved metal nameplate mounted with corrosion-resistant screws. Provide red nameplates for emergency or stand-by power branch fed panels. Nameplate shall include:
 - 1. Normal Power
 - a. Panel Name
 - b. Voltage "277/480", "120/208", or "120/240"
 - 2. Generator Powered
 - a. Switchboard Name
 - b. Voltage "277/480", "120/208", or "120/240"
 - c. Non-Hospital
 - 1) Non-emergency, "Stand-By Branch"
 - 2) Life Safety Non-Hospital, "Life Safety Branch"
 - d. Hospital Essential Branches:
 - 1) "Life Safety"
 - 2) "Critical Branch"
 - 3) "Equipment Branch"

3.4 CONNECTIONS

- A. Install equipment grounding connections for switchboards with ground continuity to main electrical ground bus.
- B. 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. Prepare for acceptance tests as follows:
 - 1. Test insulation resistance for each switchboard bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.

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- B. Testing: After installing switchboards 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, Sections 7.1, 7.5, 7.6, 7.9, 7.10, 7.11, and 7.14 as appropriate. 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.

3.6 ADJUSTING

- A. Provide factory technician to set according to coordination studies or factory recommended settings
 - 1. GFI Settings
 - 2. Field-adjustable switches
 - 3. Circuit-breaker trip ranges.

3.7 CLEANING

- A. On completion of installation, inspect interior and exterior of switchboards. 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 262413

SECTION 262726

WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes receptacles, connectors, switches, and finish plates.

1.3 DEFINITIONS

- A. GFCI/GFI: Ground-fault circuit interrupter.
- B. SPD: Surge protective device.

1.4 SUBMITTALS

- A. Product Data: For each product specified.
- B. Shop Drawings: Legends for receptacles and switch plates.
- C. Samples: For devices and device plates for color selection and evaluation of technical features.
- D. Maintenance Data: For materials and products to include in maintenance manuals specified in Division 1.

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. Receptacles for Owner-Furnished Equipment: Match plug configurations.
 - 1. Cord and Plug Sets: Match equipment requirements.

1.7 EXTRA MATERIALS

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- 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. Deliver extra materials to Owner.
 - 1. Telephone/Power Service Poles: One for each 10, but not less than one.
 - 2. Floor Service-Outlet Assemblies: One for each 10, but not less than one.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Wiring Devices:
 - a. Bryant Electric, Inc.
 - b. Eaton.
 - c. Hubbell, Inc.; Wiring Devices Div.
 - d. Killark Electric Manufacturing Co.
 - e. Leviton Manufacturing Co., Inc.
 - f. Pass & Seymour/Legrand; Wiring Devices Div.
 - 2. Multi-outlet Assemblies:
 - a. Airey-Thompson Co.
 - b. Wiremold.
 - 3. Floor Service Outlets and Telephone/Power Poles:
 - a. American Electric.
 - b. Hubbell, Inc.; Wiring Devices Div.
 - c. Pass & Seymour/Legrand; Wiring Devices Div.
 - d. Square D Co.
 - e. Wiremold.

2.2 RECEPTACLES

- A. Straight-Blade and Locking Receptacles: Commercial spec grade Configuration NEMA 5-20R. Color by Architect/Owner.
- B. GFCI 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 2¾-inch-deep outlet box without an adapter. Provide with test light as per NEC.
- C. Isolated-Ground Receptacles: Equipment grounding contacts connected only to the green grounding screw terminal of the device with inherent electrical isolation from mounting strap.
 - 1. Devices: Orange in color and listed and labeled as isolated-ground receptacles.
 - 2. Isolation Method: Integral to receptacle construction and not dependent on removable parts.
- D. TVSS Receptacles: Duplex type, NEMA WD 6, Configuration 5-20R, with integral TVSS in line to ground, line to neutral, and neutral to ground.
- E. USB Receptacles:

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1. USB Charger Tamper-Resistant Receptacle, Two USB Type 2.0 ports 3.5 Amp, 5 Volt DC, 20 Amp, 125 Volt AC Decorator Duplex.
 - a. Green LED indicator to show USB power available.
 - b. Impact and chemical resistant.
 - c. Flush fit design.
 - d. Meets UL94 for 5V flammability rating.
 - e. Complies with battery charging specification USB BC1.2.
 - f. Compatible with USB 1.1/2.0/3.0 devices.
 - g. Listed to UL498 and UL1310.
- F. Industrial Heavy-Duty Receptacle: Comply with IEC 309-1.
- G. All receptacles on emergency/stand-by power shall be red hospital grade. Faceplate color by Architect. All emergency/stand-by power receptacles shall have circuit numbers on faceplate. Refer to panel schedules and one-line for emergency/stand-by power branches.
- H. Fifteen amp (15A) receptacles are not acceptable and shall not be installed unless specifically directed by the engineer.

2.3 PENDANT CORD/CONNECTOR DEVICES

- A. Description: Matching, locking type, plug and receptacle body connector, NEMA WD 6, Configurations L5-20P and L5-20R, Heavy-Duty grade.
 1. Body: Nylon with screw-open cable-gripping jaws and provision for attaching external cable grip.
 2. External Cable Grip: Woven wire-mesh type made of high-strength galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector. (Kellum or equal)

2.4 CORD AND PLUG SETS

- A. Description: Match voltage and current ratings and number of conductors to requirements of equipment being connected.
 1. Cord: Rubber-insulated, stranded-copper conductors, with type SOW-A jacket. Green-insulated grounding conductor, and equipment-rating ampacity plus a minimum of 30 percent.
 2. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.5 SWITCHES

- A. Snap Switches: Commercial spec grade.
- B. Combination Switch and Receptacle: Both devices in a single gang unit with plaster ears and removable tab connector that permit separate or common feed connection.
 1. Switch: 20 A, 120/277-V ac.
 2. Receptacle: NEMA WD 6, Configuration 5-20R.
- C. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on/off switches and audible and electromagnetic noise filters rated for amperage and voltage listed.

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1. Control: Continuously adjustable slide, and push-button on/off. Single-pole or three-way switch to suit connections.
2. Incandescent Lamp Dimmers: Modular, 120 V, 60 Hz with continuously adjustable slide and toggle or rocker; single pole with soft tap or other quiet switch; electromagnetic filter to eliminate noise, RF, and TV interference; and 5-inch wire connecting leads.

2.6 WALL PLATES

- A. Single and combination types match corresponding wiring devices.
 1. Plate-Securing Screws: Metal with head color to match plate finish. Color by Architect.
 2. Material for Finished Spaces:
 - a. Smooth, unbreakable nylon; color by Architect.
 3. Material for Kitchens, Unfinished spaces (Mechanical, Electrical), and surface mounted locations: stainless steel.

2.7 FLOOR SERVICE FITTINGS

- A. Type: Modular, flush-type, dual-service units suitable for wiring method used.
- B. Compartmentation: Barrier separates power and signal compartments.
- C. Housing Material: Die-cast aluminum, satin finished.
- D. Power Receptacle: NEMA WD 6, Configuration 5-20R, gray finish, unless otherwise indicated.
- E. Signal Outlet: Blank cover with bushed cable opening, unless otherwise indicated.

2.8 MULTI-OUTLET ASSEMBLIES

- A. Components of Assemblies: Products from a single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.
- B. Raceway Material: Metal, with manufacturer's standard finish.
- C. Raceway Material: Nonmetal.
- D. Wire: No. 12 AWG.

2.9 TELEPHONE/POWER SERVICE POLES

- A. Description: Factory-assembled and -wired units to extend power, telephone, and data service from distribution wiring concealed in ceiling to devices or outlets in pole near floor.
 1. Poles: Nominal 2.5-inch-square cross section with height adequate to extend from floor to at least 6 inches above ceiling, and separate channels for power and signal wiring.
 2. Mounting: Ceiling trim flange with concealed bracing arranged for positive connection to ceiling supports, and pole foot with carpet pad attachment.

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3. Finishes: One of manufacturers standard finish and trim combinations, including painted and satin anodized-aluminum finishes and wood-grain-type trim.
4. Wiring: Sized for six No. 12 AWG power and ground conductors; one 75-ohm coaxial telephone/data cable; and four four-pair, 75-ohm telephone/data cable.
5. Power Receptacles: four single; 20-A; heavy-duty; NEMA WD 6, Configuration 5-20R units.
6. Signal Outlets: Blank insert with bushed cable opening.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install devices and assemblies straight, plumb and secure.
- B. Install devices as per ADA height requirements.
- C. Review Architectural elevations to coordinate locations and mounting heights. If there are any discrepancies request information prior to install. If height is not listed on the drawings refer to the following:
 1. General purpose receptacles @ 18" AFF.
 2. General purpose receptacles at retirement facilities, nursing homes, hospice, nursing facilities @ 24" AFF.
 3. TV receptacles at the TV mounting location (see architectural elevations) or at 96" AFF.
 4. Above counter receptacles @ 6" above backsplash.
 5. Toilet room receptacles @ 48" AFF.
 6. Equipment receptacles at the piece of equipment. Coordinate with architectural elevations and equipment submittals.
 7. Receptacles shall not be installed flat on any counter surface.
- D. Install wall plates when painting is complete. Remove all paint from any wall plates.
- E. Provide GFI receptacles within 6 feet of all sinks, exterior receptacles, undercounter equipment, at exterior HVAC equipment, vending machines, and in kitchens.
- F. Install wall dimmers to achieve indicated rating after de-rating for ganging as instructed by manufacturer.
- G. Do not share neutral conductor on load side of dimmers.
- H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.
- I. Protect devices and assemblies during painting.
- J. Adjust locations at which floor service outlets and telephone/power service poles are installed to suit arrangement of partitions and furnishings.
- K. GFCI or GFI receptacles shall be wired to "trip" individually not the entire circuit. Receptacles shall not be daisy chained together from a GFI and create a GFI "protected" receptacle.

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3.2 IDENTIFICATION

- A. Comply with Section "Electrical Identification."
 - 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. Connect wiring device grounding terminal to branch-circuit equipment grounding conductor.
- B. Isolated-Ground Receptacles: Connect to isolated-ground conductor routed to designated isolated equipment ground terminal of electrical system.
- C. 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. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.
- C. 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 262726

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SECTION 262816

DISCONNECT SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes individually mounted switches and circuit breakers used for the following:
 - 1. Service disconnect switches.
 - 2. Feeder and equipment disconnect switches.
 - 3. Feeder branch-circuit protection.
 - 4. Motor disconnect switches.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section "Wiring Devices" for attachment plugs and receptacles, and snap switches used for disconnect switches.
 - 2. Section "Switchboards" for individually enclosed, fused power-circuit devices used as feeder disconnect switches.

1.3 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for disconnect switches, circuit breakers, and accessories specified in this Section.
- C. Wiring diagrams detailing wiring for power and control systems and differentiating between manufacturer-installed and field-installed wiring.
- D. Field test reports.
- E. Maintenance data for tripping devices to include in the operation and maintenance manual specified in Division 1.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain disconnect switches and circuit breakers from one source and by a single manufacturer.
- B. Comply with NFPA 70 for components and installation.

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- C. Listing and Labeling: Provide disconnect switches and circuit breakers specified in this Section that are listed and labeled.
 - 1. The Terms “Listed” and “Labeled”: As defined in the National Electrical Code, Article 100.

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:
 - 1. Molded-Case Circuit Breakers:
 - a. Siemens Energy & Automation, Inc.
 - b. Square D Co.
 - c. Eaton
 - 2. Combination Circuit Breaker and Ground Fault Trip:
 - a. Siemens Energy & Automation, Inc.
 - b. Square D Co.
 - c. Eaton
 - 3. Molded-Case, Current-Limiting Circuit Breakers:
 - a. Siemens Energy & Automation, Inc.
 - b. Square D Co.
 - c. Eaton
 - 4. Integrally Fused, Molded-Case Circuit Breakers:
 - a. Siemens Energy & Automation, Inc.
 - b. Square D Co.
 - c. Eaton

2.2 DISCONNECT SWITCHES

- A. General: Heavy Duty safety switch, service entrance rated if indicated, with grounding lug kit, rated for equipment amperage, capable to be locked in the open position, with number of poles matching equipment connections.
- B. Enclosed, 600V Nonfusible Switch: NEMA KS 1, Type HD, with lockable handle. Switch shall be rated for equipment amperage.
- C. Enclosed, 600V Fusible Switch, 800 A and Smaller: NEMA KS 1, Type HD, clips to accommodate specified fuses, enclosure consistent with environment where located, handle lockable with 2 padlocks, and interlocked with cover in CLOSED position. Switch shall be rated for equipment amperage.
- D. Enclosure: NEMA KS 1, Type 1, unless otherwise specified or required to meet environmental conditions of installed location.
 - 1. Outdoor Locations: Type 3R.
 - 2. Wet or Damp Indoor Locations: Type 4.

2.3 ENCLOSED CIRCUIT BREAKERS

- A. Enclosed, Molded-Case Circuit Breaker: NEMA AB 1, with lockable handle.

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- B. Characteristics: Frame size, trip rating, number of poles, and auxiliary devices as indicated and interrupting rating to meet available fault current. Breakers will be fully rated for panel AIC rating.
- C. Application Listing: Appropriate for application, including switching fluorescent lighting loads or heating, air-conditioning, and refrigerating equipment.
- D. Circuit Breakers, 200 A and Larger: Trip units interchangeable within frame size.
- E. Circuit Breakers, 400 A and Larger: Field-adjustable, short-time and continuous-current settings.
- F. Current-Limiting Trips: Where indicated, let-through ratings less than NEMA FU 1, Class RK-5.
- G. Current Limiters: Where indicated, integral fuse listed for circuit breaker.
- H. Molded-Case Switch: Where indicated, molded-case circuit breaker without trip units.
- I. Lugs: Mechanical lugs and power-distribution connectors for number, size, and material of conductors indicated.
- J. Shunt Trip: Where indicated.
- K. Accessories: As indicated.
- L. Enclosure: NEMA AB 1, Type 1, unless otherwise specified or required to meet environmental conditions of installed location.
 - 1. Outdoor Locations: Type 3R.
 - 2. Wet or Damp Indoor Locations: Type 4.
 - 3. Hazardous Areas Indicated on Drawings: Type 7C.
- M. Transient Voltage Surge Suppressors: IEEE C62.41, to meet requirements for category indicated.
 - 1. Exposure: High.
 - 2. Impulse sparkover voltage coordinated with system circuit voltage.
 - 3. Factory mounted with UL-recognized mounting device.
- N. Motor circuit breakers shall be Square D thermal magnetic breakers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install disconnect switches and circuit breakers in locations as indicated, according to manufacturer's written instructions. Provide 2-inch clearance for operation and maintenance.
- B. Install disconnect switches and circuit breakers level and plumb.
- C. Install wiring between disconnect switches, circuit breakers, control, and indication devices.

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- D. Provide power to all shunt trip circuit breakers/switches from panel the breakers are mounted in or fed from unless indicated otherwise on drawings. Provide 20A 1P CB and label shunt trip power.
- E. Grounding: Ground case and metallic conduit of disconnects.
- F. Provide working clearance in front of disconnect switch per NEC, minimum 36 inches.
- G. Connect disconnect switches and circuit breakers and components to wiring system and to ground as indicated and instructed by manufacturer.
 - 1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486 A and UL 486 B.
- H. Identify each disconnect switch and circuit breaker according to requirements specified in Section "Electrical Identification."

3.2 FIELD QUALITY CONTROL

- A. Testing: After installing disconnect switches and circuit breakers 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 stated in NETA ATS, Section 7.5 for disconnect switches 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
- B. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, remove and replace with new units and retest.
- C. Infrared Scanning: After Substantial Completion, but not more than two (2) months after Final Acceptance, perform an infrared scan of each disconnect switch and circuit breaker. Remove fronts to make joints and connections accessible to a portable scanner.
 - 1. Follow-up Infrared Scanning: Perform one (1) additional follow-up infrared scan of each disconnect switch and circuit breaker 11 months after date of Substantial Completion.
 - 2. Instrument: Use an approved infrared scanning device designed to measure temperature or detect significant deviations from normal values. Provide calibration record for device used.
 - 3. Record of Infrared Scanning: Prepare a certified report identifying disconnect switch and circuit breaker checked and describing results of scanning. Include notation of deficiencies detected, remedial action taken and observations after remedial action.

3.3 ADJUSTING

- A. Set field-adjustable disconnect switches and circuit-breaker trip ranges as indicated by the Electrical System Coordination Study. Refer to Section – Overcurrent Protection for fault current analysis, coordination study, electrical tests, and device setting requirements.

3.4 CLEANING

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- A. After completing system 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 262816

SECTION 263450

SHORT-CIRCUIT/COORDINATION STUDY/ARC FLASH HAZARD ANALYSIS

PART 1 - GENERAL

1.1 SCOPE

- A. The contractor shall furnish short-circuit and protective device coordination studies as prepared by the electrical equipment manufacturer or an approved engineering firm. The study shall be started and results submitted prior to ordering any distribution equipment.
- B. Prior to any rough-in the contractor shall obtain at minimum an approval from the preliminary coordination study. Any installation prior to obtaining the approval shall be at the contractor's risk.
- C. Medical facilities shall coordinate to 0.1s. Electrical gear shall be bid and submitted with this rating as a basis of design.
- D. The contractor shall furnish an Arc Flash Hazard Analysis Study per the requirements set forth in NFPA 70E – Standard for Electrical Safety in the Workplace. The arc flash hazard analysis shall be performed according to the IEEE 1584 equations that are presented in NFPA70E-2004, Annex D.
- E. The scope of the studies shall include all new distribution equipment supplied by the equipment Manufacturer under this contract.

1.2 REFERENCES

- A. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - 1. IEEE 141 – Recommended Practice for Electrical Power Distribution and Coordination of Industrial and Commercial Power Systems.
 - 2. IEEE 242 – Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems.
 - 3. IEEE 399 – Recommended Practice for Industrial and Commercial Power System Analysis.
 - 4. IEEE 241 – Recommended Practice for Electric Power Systems in Commercial Buildings.
 - 5. IEEE 1015 – Recommended Practice for Applying Low-Voltage Circuit Breakers Used in Industrial and Commercial Power Systems.
 - 6. IEEE 1584 – Guide for Performing Arc-Flash Hazard Calculations.
- B. American National Standards Institute (ANSI):
 - 1. ANSI C57.12.00 – Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers.
 - 2. ANSI C37.13 – Standard for Low Voltage AC Power Circuit Breakers Used in Enclosures.
 - 3. ANSI C37.010 – Standard Application Guide for AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis.

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4. ANSI C37.41 – Standard Design Tests for High Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches and Accessories.
- C. The National Fire Protection Association (NFPA)
1. NFPA 70 – National Electrical Code, latest edition.
 2. NFPA 70E – Standard for Electrical Safety in the Workplace.

1.3 SUBMITTALS FOR REVIEW/APPROVAL

- A. The short-circuit and protective device coordination 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. If formal completion of the studies may cause delay in equipment manufacturing, approval from the engineer may be obtained for preliminary submittal of sufficient study data to ensure that the selection of device and characteristics will be satisfactory.

1.4 SUBMITTAL FOR CONSTRUCTION

- A. The results of the short-circuit, protective device coordination and arc flash hazard analysis studies shall be summarized in a final report. No more than five (5) bound copies of the complete final report shall be submitted. For large system studies, submittals requiring more than five (5) copies of the report will be provided without the section containing the computer printout of the short-circuit input and output data. Additional copies of the short-circuit input and output data, where required, shall be provided on CD in PDF format.
- B. The report shall include the following sections:
1. Executive Summary.
 2. Descriptions, purpose, basis and scope of the study.
 3. Tabulations of circuit breaker, fuse and other protective device ratings versus calculated short circuit duties.
 4. Protective device time versus current coordination curves, tabulations of relay and circuit breaker trip unit settings, fuse selection.
 5. Fault current calculations including a definition of terms and guide for interpretation of the computer printout.
 6. Details of the incident energy and flash protection boundary calculations.
 7. Recommendations for system improvements, where needed.
 8. One-line diagram.
- C. Arc flash labels shall be provided in hard copy only at least 30 days prior to energizing the electrical equipment.

1.5 QUALIFICATIONS

- A. The short-circuit, protective device coordination and arc flash hazard analysis studies shall be conducted under the supervision and approval of a Registered Professional Electrical Engineer skilled in performing and interpreting the power system studies.
- B. The Registered Professional Electrical Engineer shall be a full-time employee of the equipment manufacturer or an approved engineering firm.

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- C. The Registered Professional Electrical Engineer shall have a minimum of five (5) years of experience in performing power system studies.
- D. The equipment manufacturer or approved engineering firm shall demonstrate experience with Arc Flash Hazard Analysis by submitting names of at least ten actual arc flash hazard analysis it has performed in the past year.

1.6 COMPUTER ANALYSIS SOFTWARE

- A. The studies shall be performed using the latest revision of the SKM Systems Analysis Power* Tools for Windows (PTW) software program or equal.

PART 2 - PRODUCTS

2.1 STUDIES

- A. Contractor to furnish short-circuit and protective device coordination studies as prepared by equipment manufacturer or an approved engineering firm.
- B. 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.

2.2 DATA COLLECTION

- A. A Contractor shall furnish all data as required by the power system studies. The Engineer performing the short-circuit, protective device coordination and arch flash hazard analysis studies shall furnish the Contractor with a listing of required data immediately after award of the contract. The Contractor shall expedite collection of the data to assure completion of the studies as required for final approval of the distribution equipment shop drawings and/or prior to the release of the equipment for manufacturing.
- B. Source combination may include present and future motors and generators.
- C. Load data utilized may include existing and proposed loads obtained from Contract Documents provided by Owner, or Contractor.
- D. If applicable, include fault contribution of existing motors in the study. The Contractor shall obtain required existing equipment data, if necessary, to satisfy the study requirements.

2.3 SHORT-CIRCUIT AND PROTECTIVE DEVICE EVALUATION STUDY

- A. Use actual conductor impedances if known. If unknown, use typical conductor impedances base on IEEE Standard 141-1993.
- B. Transformer design impedances shall be used when test impedances are not available.
- C. Provide the following:
 - 1. Calculation methods and assumptions.
 - 2. Selected base per unit quantities.

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3. One-line diagram of the system being evaluated.
 4. Source impedance data, including electric utility system and motor fault contribution characteristics.
 5. Tabulations of calculated quantities.
 6. Results, conclusions and recommendations.
- D. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault at each:
1. Electric utility's supply termination point.
 2. Incoming switchgear.
 3. Unit substation primary and secondary terminals.
 4. Low voltage switchgear.
 5. Motor control centers.
 6. Standby generators and automatic transfer switches.
 7. Branch circuit panelboards.
 8. Other significant locations throughout the system.
- E. For grounded systems, provide a bolted line-to-ground fault current study for areas as defined for the three-phase bolted fault short-circuit study.
- F. Protective Device Evaluation:
1. Evaluate equipment and protective devices and compare to short circuit ratings.
 2. Adequacy of switchgear, motor control centers, and panelboard bus bars to withstand short-circuit stresses.
 3. Notify Owner in writing, of existing, circuit protective devices improperly rated for the calculated available fault current.

2.4 PROTECTIVE DEVICE COORDINATION STUDY

- A. Proposed protective device coordination time-current curves (TCC) shall be displayed on log-log scale graphs.
- B. Include on each TCC graph, a complete title and one-line diagram with legend identifying the specific portion of the system covered.
- C. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which the device is exposed.
- D. Identify the device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.
- E. Plot the following characteristics on the TCC graphs, where applicable:
1. Electric utility's overcurrent protective device.
 2. Medium voltage equipment overcurrent relays.
 3. Medium and low voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands.
 4. Low voltage equipment circuit breaker trip devices, including manufacturer's tolerance bands.

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5. Transformer full-load current, magnetizing inrush current and ANSI through-fault protection curves.
 6. Conductor damage curves.
 7. Ground fault protective devices, as applicable.
 8. Pertinent motor starting characteristics and motor damage points, where applicable.
 9. Pertinent generator short-circuit breaker in each motor control center and applicable panelboard.
- F. Provide adequate time margins between device characteristics such that selective operation is provided, while providing proper protection.

2.5 ARC FLASH HAZARD ANALYSIS

- A. The arc flash hazard analysis shall be performed according to the IEEE 1584 equations that are presented in NFPA70E-2004, Annex D.
- B. The flash protection boundary and the incident energy shall be calculated at all significant locations in the electrical distribution system (switchboards, switchgear, motor-control centers, panelboards, busway and splitters) where work could be performed on energized parts.
- C. The Arc-Flash Hazard Analysis shall include all significant locations in 240 volt and 208 volt systems fed from transformers equal to or greater than 1285 kVA where work could be performed on energized parts.
- D. Safe working distances shall be based upon the calculated arc flash boundary considering an incident energy of 1.2 cal/cm².
- E. When appropriate, the short circuit calculations and the clearing times of the phase overcurrent devices will be retrieved from the short-circuit and coordination study model. Ground overcurrent relays should not be taken into consideration when determining the clearing time when performing incident energy calculations.
- F. The short-circuit calculations and the corresponding incident energy calculations for multiple system scenarios must be compared and the greatest incident energy must be uniquely reported for each equipment location. Calculations must be performed to represent the maximum and minimum contributions of fault current magnitude for all normal and emergency operating conditions. The minimum calculation will assume that the utility contribution is at a minimum and will assume a minimum motor contribution (all motors off). Conversely, the maximum calculation will assume a maximum contribution from the utility and will assume the maximum amount of motors to be operating. Calculations shall take into consideration the parallel operation of synchronous generators with the electric utility, where applicable.
- G. The incident energy calculation must consider the accumulation of energy over time when performing arc flash calculations on buses with multiple sources. Iterative calculations must take into account the changing current contributions, as the sources are interrupted or decremented with time. Fault contribution from motors and generators should be decremented as follows:
 1. Fault contribution from induction motors should not be considered beyond 3-5 cycles.
 2. Fault contribution from synchronous motors and generators should be decayed to match the actual decrement of each as closely as possible (e.g. contributions from

permanent magnet generators will typically decay from 10 per unit to 3 per unit after 10 cycles).

- H. For each equipment location with a separately enclosed main device (where there is adequate separation between the lines side terminals of the main protective device and the work location), calculations for incident energy and flash protection boundary shall include both the line and load side of the main breaker.
- I. When performing incident energy calculation on the line side of a main breaker (as required per above), the line side and load side contributions must be included in the fault calculation.
- J. Miss-coordination should be checked amongst all devices within the branch containing the immediate protective device upstream of the calculation location and the calculation should utilize the fastest device to compute the incident energy for the corresponding location.
- K. Arc Flash calculations shall be based on actual overcurrent protective device clearing time. Maximum clearing time will be capped at 2 seconds based on IEEE 1584-2002 section B.1.2. Where it is not physically possible to move outside the flash protections boundary in less than 2 seconds during an arc flash event, a maximum clearing time based on the specific location shall be utilized.

2.6 REPORT SECTIONS

- A. Input data shall include, but not be limited to the following:
 - 1. Feeder input data including feeder type (cable or bus), size, length, number per phase, conduit type (magnetic or non-magnetic) and conductor material (copper or aluminum).
 - 2. Transformer input data, including winding connections, secondary neutral-ground connection, primary and secondary voltage ratings, kVA rating, impedance, % taps and phase shift.
 - 3. Reactor data, including voltage rating, and impedance.
 - 4. Generation contribution data, (synchronous generators and Utility), including short-circuit reactance ($X'd$), rated MVA, rated voltage, three-phase and single line-ground contribution (for Utility sources) and X/R ratio.
 - 5. Motor contribution data (induction motors and synchronous motors), including short-circuit reactance, rated horsepower or kVA, rated voltage, and X/R ratio.
- B. Short-circuit Output Data shall include, but not be limited to the following reports:
 - 1. Low Voltage Fault Report shall include a section for three-phase and unbalanced fault calculations and shall show the following information for each applicable location:
 - a. Voltage.
 - b. Calculated fault current magnitude and angle.
 - c. Fault point X/R ratio.
 - d. Equivalent impedance.
 - 2. Momentary Duty Report shall include a section for three-phase and unbalanced fault calculations and shall show the following information for each applicable location:
 - a. Voltage.
 - b. Calculated symmetrical fault current magnitude and angle.
 - c. Fault point X/R ratio.
 - d. Calculated asymmetrical fault currents.
 - 1) Based on fault point X/R ratio.
 - 2) Based on calculated symmetrical value multiplied by 1.6.
 - 3) Based on calculated symmetrical value multiplied by 2.7.

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- e. Equivalent impedance.
3. Interrupting Duty Report shall include a section for three-phase and unbalanced built calculations and shall show the following information for each applicable location:
 - a. Voltage.
 - b. Calculated symmetrical fault current magnitude and angle.
 - c. Fault point X/R ratio.
 - d. No AC Decrement (NACD) ratio.
 - e. Equivalent impedance.
 - f. Multiplying factors for 2, 3, 5 and 8 cycle circuit breakers rated on a symmetrical basis.
 - g. Multiplying factors for 2, 3, 5 and 8 cycle circuit breakers rated on a total basis.
- C. Recommended Protective Device Settings:
 1. Phase and Ground Relays:
 - a. Current transformer ratio.
 - b. Current setting.
 - c. Time setting.
 - d. Instantaneous setting.
 - e. Recommendations on improved relaying systems, if applicable.
 2. Circuit Breakers:
 - a. Adjustable pickups and time delays (long time, short time, ground).
 - b. Adjustable time-current characteristic.
 - c. Adjustable instantaneous pickup.
 - d. Recommendations on improved trip systems, if applicable.
- D. Incident energy and flash protection boundary calculations.
 1. Arcing fault magnitude.
 2. Protective device clearing item.
 3. Duration of arc.
 4. Arc flash boundary.
 5. Working distance.
 6. Incident energy.
 7. Hazard Risk Category.
 8. Recommendations for arc flash energy reduction.

PART 3 - EXECUTION

3.1 FIELD ADJUSTMENT

- A. Adjust relay and protective device settings according to the recommended settings table provided by the coordination study. Field adjustments to be completed by the engineering service division of the equipment manufacturer under the Startup and Acceptance Testing contract portion.
- B. Make minor modifications to equipment as required to accomplish conformance with short circuit and protective device coordination studies.
- C. Notify Owner in writing of any required major equipment modifications.

3.2 ARC FLASH WIRING LABELS

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- A. The contractor of the Arc Flash Hazard Analysis shall provide a 3.5 in. x 5 in. thermal transfer type label of high adhesion polyester for each work location analyzed.
- B. All labels will be based on recommended overcurrent device settings and will be provided after the results of the analysis have been presented to the owner and after any system changes, upgrades or modifications have been incorporated in the system.
- C. The label shall include the following information, at a minimum:
 - 1. Location designation.
 - 2. Nominal voltage.
 - 3. Flash protection boundary.
 - 4. Hazard risk category.
 - 5. Incident energy.
 - 6. Working distance.
 - 7. Engineering report number, revision number and issue date.
- D. Labels shall be machine printed, with no field markings.
- E. Arc flash labels shall be provided in the following manner and all labels shall be based on recommended overcurrent device settings.
 - 1. For each 480 and applicable 208 volt panelboard, one arc flash label shall be provided.
 - 2. For each motor control center, one arc flash label shall be provided.
 - 3. For each low voltage switchboard, one arc flash label shall be provided.
 - 4. For each switchgear, one flash label shall be provided.
 - 5. For medium voltage switches one arc flash label shall be provided.
- F. Labels shall be field installed by the engineering service division of the equipment manufacturer under the Startup and Acceptance Testing contract portion.
- G. Example of Arc Flash Warning Label:

	
WARNING	
Arc Flash and Shock Hazard Appropriate PPE Required	
488 inch	Flash Hazard Boundary
40.0	cal/cm² Flash Hazard at 45 inches
Class 4	Cotton Underwear + FR Shirt & Pant + Multi Layer Flash Suit + Hood
480 VAC	Shock Hazard when cover is removed
00	Glove Class
42 inch	Limited Approach (Fixed Circuit)
12 inch	Restricted Approach
1 inch	Prohibited Approach
Bus: CPK4S 1A LINE Prot: F5/SUB CPK4S 1A	

3.3 ARC FLASH TRAINING

- A. The contractor of the Arc Flash Hazard Analysis shall train the owner's qualified electrical personnel of the potential arc flash hazards associated with working on energized equipment (minimum 4 hours). The training shall be certified for continuing education units (CEU's) by the International Association for Continuing Education Training (IACET) or equivalent.

END OF SECTION 263450

SECTION 263620

BYPASS TRANSFER SWITCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Furnish and install bypass isolation transfer switches (ATS/BP) with number of poles, amperage, voltage, withstand and close-on ratings as show on the plans. The ATS/BP shall consist of an inherently double-throw power transfer switch mechanism, a bypass-isolation switch, and a microprocessor controller to provide automatic operation contained within the same cabinet. All ATS/BP units and controllers shall be the products of the same manufacturer. Electrical work shall be in accordance with Section "General Conditions for All Electrical Word."

1.3 SUBMITTALS

- A. Product Data: Include ratings and dimensioned plans, sections, and elevations showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified.
- B. Specification Compliance Review:
 - 1. Manufacturers and bidders must provide the consulting engineer with a Compliance Review of the Specifications and Addenda's. The Compliance Review shall be a paragraph-by-paragraph review of the Specifications and schedule with the following information; "C", "D", or "E" marked in the margin of the original Specifications and any subsequent Addenda's. If the manufacturer or bidder does not provide the Compliance Review to the engineer for review, with the submittal, the submittal will be subject to rejection as non-compliant.
 - a. "C" Comply with no exceptions.
 - b. "D" Comply with deviations. For each and every deviation, provide a numbered footnote with reasons for the proposed deviation and how the intent of the Specification can be satisfied.
 - c. "E" Exception, do not comply. For each and every exception, provide a numbered footnote with reasons and possible alternatives. Non-compliance with the specifications is grounds for rejection as unacceptable. A bid from any alternative or listed equipment manufacturer with any number of exceptions will be reason for rejection for non-compliance without further review.
 - d. Unless a deviation or exception is specifically noted in the Compliance Review, the manufacturer shall provide full compliance with entire specification. Deviations or exceptions taken in letters or cover letters in a bid document, subsidiary documents, by omission or by contradiction do not release the manufacturer or bidder from being in complete compliance, unless the exception or deviation has been specifically noted in the Compliance Review and approved by the consulting engineer.

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- e. Equipment manufacturers or bidders that do not meet the specifications thru the above process will be subject to rejection without further review.

- C. Wiring Diagrams: Detail wiring for transfer switches and differentiate between manufacturer-installed and field-installed wiring. Show both power and control wiring.

- D. Single-Line Diagram: Show connections between transfer switch, bypass/isolation switch, power sources, and load; and show interlocking provisions for each combined transfer switch and bypass/isolation switch.

- E. Product Certificates: Signed by manufacturer certifying that products furnished comply with requirements and that switches have been tested for load ratings and short-circuit closing and withstand ratings applicable to units for Project.

- F. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

- G. Field Test Reports: Indicate and interpret test and inspection results for compliance with performance requirements.

- H. Maintenance Data: For each type of product to include in maintenance manuals specified in Division 1. Include all features and operating sequences, both automatic and manual. List all factory settings of relays and provide relay-setting and calibration instructions, including software, where applicable.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Maintain a service center capable of providing emergency maintenance and repairs at Project site with an eight-hour maximum response time.

- B. Source Limitations: Obtain automatic transfer switch, bypass/isolation switch, nonautomatic transfer switch, remote annunciators, and remote annunciator and control panels through one source from a single manufacturer.

- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, for emergency service under UL 1008, by a testing agency acceptable to authorities having jurisdiction.

- D. Work shall be performed in accordance with quality commercial practices. The appearance of the finished work shall be of equal importance with its operation. Materials and equipment shall be installed based upon the actual dimensions and conditions at the project site. Locations for materials requiring an exact fit shall be measured.
 - 1. Comply with NEMA ICS 1.
 - 2. Comply with NFPA 70.
 - 3. Comply with NFPA 99.
 - 4. Comply with NFPA 110.
 - 5. Comply with UL 1008, unless requirements of these Specifications are stricter.

- E. The ATS/BP and controls shall conform to the requirements of:
 - 1. IEC 947-6-1 Low-Voltage Switchgear and Control Gear; Multifunction Equipment; Automatic Transfer Switching Equipment.

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2. IEEE Standard 446: IEEE Recommended Practice for Emergency and Standby Power Systems for commercial and Industrial Applications.
3. NEMA Standard ICS 10-1993 (formerly ICS2-447): AC Automatic Transfer Switches.
4. UL 508 Industrial Control Equipment.

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:
 1. Conventional Transfer Switches:
 - a. Russelectric, Inc.

2.2 GENERAL TRANSFER-SWITCH PRODUCT REQUIREMENTS

- A. Tested Fault-Current Closing and Withstand Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.
- B. Voltage, number of poles, and continuous amperage rating.
- C. The complete transfer switch assembly shall be factory tested to UL 1008 requirements.

2.3 CONSTRUCTION

- A. General
 1. The automatic transfer switch (ATS) and its associated bypass/isolation (BPS) shall be furnished as shown on the drawings. Voltage and continuous current ratings and number of poles shall be as shown.
 2. On 3 phase, 4 wire systems, utilizing ground fault protection, a true 4 pole switch shall be supplied with all four poles mounted on a common shaft. The continuous current rating and the closing and withstand rating of the fourth pole shall be identical to the rating of the main poles.
 3. The combination automatic transfer bypass/isolation switch shall be mounted in a freestanding NEMA 1 enclosure, unless otherwise indicated. Enclosures shall be fabricated from 12 gauge steel. The enclosure shall be sized to exceed minimum wire bending space required by UL 1008.
 4. Both units shall be bused together with silver plated copper bus to provide a complete pre-tested assembly. Aluminum bus, and/or cable interconnections are not acceptable. Construction shall be such that the contractor needs to install only the power and control connections.
 5. Bypass/isolation switches shall provide a safe and convenient means for manually bypassing and isolating the automatic transfer switch, regardless of the condition or position of the ATS, with the ability to be used as an emergency back-up system in the event the transfer switch should fail. In addition, the bypass/isolation switch shall be utilized to facilitate maintenance and repair of the automatic transfer switch.
 6. The automatic transfer switch shall be completely isolated from the bypass/isolation switch by means of insulating barriers and separate access doors to positively prevent hazard to operating personnel while servicing the automatic transfer switch.

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7. The transfer switch shall be equipped with an internal welded steel pocket, housing an operations and maintenance manual.
 8. The combination automatic transfer bypass/isolation switch shall be top and bottom accessible.
 9. The main contacts shall be capable of being replaced without removing the main power cables.
 10. The main contacts shall be visible for inspection without any major disassembly of the transfer switch.
 11. All bolted bus connections shall have Belleville compression type washers.
 12. When a solid neutral is required, a fully rated bus bar with required AL-CU neutral lugs shall be provided.
 13. Control components and wiring shall be front accessible. All control wires shall be multiconductor 18 gauge 600 volt SIS switchboard type point to point harness. All control wire terminations shall be identified with tubular sleeve-type markers.
 14. The switch shall be equipped with 90 degrees C rated copper/aluminum solderless mechanical type lugs.
 15. The complete combination automatic transfer bypass/isolation switch assembly shall be factory tested to ensure proper operation and compliance with the specification requirements. A copy of the factory test report shall be available upon request.
- B. Automatic Transfer Switch
1. The transfer switch shall be double throw, actuated by two electric operators momentarily energized, and connected to the transfer mechanism by a simple over center type linkage. Minimum transfer time shall be 400 milliseconds.
 2. The normal and emergency contacts shall be positively interlocked mechanically and electrically to prevent simultaneous closing. Main contacts shall be mechanically locked in both the normal and emergency positions without the use of hooks, latches, magnets, or springs, and shall be silver-tungston alloy. Separate arcing contacts with magnetic blowouts shall be provided on all transfer switches. Interlocked, molded case circuit breakers or contactors are not acceptable.
 3. The transfer switch shall be equipped with a safe external manual operator, designed to prevent injury to operating personnel. The manual operator shall provide the same contact to contact transfer speed as the electrical operator to prevent a flashover from switching the main contacts slowly. The external manual operator shall be safely operated from outside of the transfer switch enclosure while the enclosure door is closed.
- C. Automatic Transfer Switch Controls
1. The transfer switch shall be equipped with a microprocessor based control system, to provide all the operational functions of the automatic transfer switch. The controller shall have two asynchronous serial ports. The controller shall have a real time clock with Nicad battery back-up.
 2. The CPU shall be equipped with self diagnostics which perform periodic checks of the memory I/O and communication circuits, with a watchdog/power fail circuit
 3. The controller shall use industry standard open architecture communication protocol for high speed serial communications via multidrop connection to other controllers and to a master terminal with up to 4000 ft of cable, or further, with the addition of a communication repeater. The serial communication port shall be RS422/485 compatible.
 4. The serial communication port shall allow interface to either the manufacturers or the owner's furnished remote supervisory control.
 5. The controller shall have password protection required to limit access to qualified and authorized personnel.

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6. The controller shall include a 20 character, LCD display, with a keypad, which allows access to the system.
 7. The controller shall include three phase over/under voltage, over/under frequency, phase sequence detection and phase differential monitoring on both normal and emergency sources.
 8. The controller shall be capable of storing the following records in memory for access either locally or remotely:
 - a. Number of hours transfer switch is in the emergency position (total since record reset).
 - b. Number of hour's emergency power is available (total since record reset).
 - c. Total transfer in either direction (total since record reset).
 - d. Date, time, and description of the last four source failures.
 - e. Date of the last exercise period.
 - f. Date of record reset.
- D. Sequence of Operation
1. When the voltage on any phase of the normal source drops below 80% or increases to 120%, or frequency drops below 90%, or increase to 110%, or 20% voltage differential between phases occurs, after a programmable time delay period of 0-9999 seconds factory set at 3 seconds to allow for momentary dips, the engine starting contacts shall close to start the generating plant.
 2. The transfer switch shall transfer to emergency when the generating plant has reached specified voltage and frequency on all phases.
 3. After restoration of normal power on all phases to a preset value of at least 90% to 110% of rated voltage, and at least 95% to 105% of rated frequency, and voltage differential is below 20%, an adjustable time delay period of 0-9999 seconds (factory set at 300 seconds) shall delay retransfer to allow stabilization of normal power. If the emergency power source should fail during this time delay period, the switch shall automatically return to the normal source.
 4. After retransfer to normal, the engine generator shall be allowed to operate at no load for a programmable period of 0-9999 seconds, factory set at 300 seconds.
- E. Automatic Transfer Switch Accessories
1. Programmable three phase sensing of the normal source set to pickup at 90% and dropout at 80% of rated voltage and overvoltage to pickup at 120% and dropout out at 110% of rated voltage. Programmable frequency pickup at 95% and dropout at 90% and over frequency to pickup at 110% and dropout at 105% of rated frequency. Programmable voltage differential between phases, set at 20%, and phase sequence monitoring.
 2. Programmable three phase sensing of the emergency source set to pickup at 90% and dropout at 80% of rated voltage and overvoltage to pickup at 120% and dropout out at 110% of rated voltage programmable frequency pickup at 95% and dropout at 90% and over frequency to pickup at 110% and dropout at 105% of rated frequency. Programmable voltage differential between phases set at 20%, and phase sequence monitoring.
 3. Time delay for override of momentary normal source power outages (delays engine start signal and transfer switch operation). Programmable 0-9999 seconds. Factory set at 3 seconds, if not otherwise specified.
 4. Time delay to control contact transition time on transfer to either source. Programmable 0-9999 seconds, factory set at 3 seconds.
 5. Time delay on retransfer to normal, programmable 0-9999 seconds, factory set at 300 seconds if not otherwise specified, with overrun to provide programmable 0-9999 second time delay, factory set at 300 seconds, unloaded engine operation after retransfer to normal.
 6. Time delay on transfer to emergency, programmable 0-9999 seconds, factory set at 3 seconds.
 7. A maintained type load test switch shall be included to simulate a normal power failure, keypad initiated.

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8. A remote type load test switch shall be included to simulate a normal power failure, remote switch initiated.
 9. A time delay bypass on retransfer to normal shall be included. Keypad initiated.
 10. Contact, rated 10 Amps 30 volts DC, to close on failure of normal source to initiate engine starting.
 11. Contact, rated 10 Amps 30 volts DC, to open on failure of normal source for customer functions.
 12. Light emitting diodes shall be mounted on the microprocessor panel to indicate: switch is in normal position, switch is in emergency position and controller is running.
 13. A plant exerciser shall be provided with (10) 7 day events; programmable for any day of the week and (24) calendar events, programmable for any month/day, to automatically exercise generating plant programmable in one minute increments. Also include selection of either "no load" (switch will not transfer) or "load" (switch will transfer) exercise period. Keypad initiated.
 14. Provision to select either "no commit" or "commit" to transfer operation in the event of a normal power failure shall be included. In the "no commit position," the load will transfer to the emergency position unless normal power returns before the emergency source has reach 90% of its rated values (switch will remain in normal). In the "commit position" the load will transfer to the emergency position after any normal power failure. Keypad initiated.
 15. Two auxiliary contacts rated 10 Amp, 120 volts AC (for switches 100 to 800 amps) 15 amp, 120 volts AC (for switches 1000 to 4000 amps), shall be mounted on the main shaft, one closed on normal, the other closed on emergency. Both contacts will be wired to a terminal strip for ease of customer connections.
 16. A three phase digital LCD voltage readout, with 1% accuracy shall display all three separate phase to phase voltages simultaneously, for both the normal and emergency source.
 17. A digital LCD frequency readout with 1% accuracy shall display frequency for both normal and emergency source.
 18. An LCD readout shall display normal source and emergency source availability.
- F. The following accessories shall be available by simple activation, via the key pad, if required.
1. Include (2) time delay contacts that open simultaneously just (milliseconds) prior to transfer in either direction. These contacts close after a time delay upon transfer. Programmable 0-9999 seconds after transfer.
 2. A block transfer function shall be included, energized from a 24VDC signal from the generator control switchgear, to allow transfer to emergency.
 3. A load shed function shall be included, energized from a 24VDC signal from the generator control switchgear, to disconnect the load from the emergency source when an overload condition occurs.
 4. A peak shave function shall be included, energized from a 24VDC signal from the generator control switchgear. This function will start the emergency generator and transfer the ATS to the emergency source reducing the utility supply to the building. After the peak shave signal is removed, the transfer switch will retransfer to the normal supply, bypassing the retransfer time delay.
- G. Approval
1. As a condition of approval, the manufacturer of the automatic transfer switches shall verify that their switches are listed by Underwriters Laboratories, Inc., Standard UL-1008 with 3 cycle short circuit closing and withstand as follows:

RMS Symmetrical Amperes 480 VAC

<u>Amperes</u>	<u>Closing and Withstand</u>	<u>Current Limiting Fuse Rating</u>
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100-400	42,000	200,000
600-800	65,000	200,000
1000-1200	85,000	200,000
1600-4000	100,000	200,000

2. During the 3 cycle closing and withstand tests, there shall be no contact welding or damage. The 3 cycle tests shall be performed without the use of current limiting fuses. The test shall verify that contacts separation has not occurred, and there is contact continuity across all phases. Test procedures shall be in accordance with UL-1008, and testing shall be certified by Underwriters' Laboratories, Inc.
3. When conducting temperature rise tests to UL-1008, the manufacture shall include post-endurance temperature rise tests to verify the ability of the Transfer switch to carry full rated current after completing the overload and endurance tests.
4. The microprocessor controller shall meet the following requirements:
 - Storage conditions - 25 degrees C to 85 degrees C
 - Operation conditions - 20 degrees C to 70 degrees C ambient
 - Humidity 0 to 99% relative humidity, noncondensing
 - Capable of withstanding infinite power interruptions
 - Surge withstand per ANSI/IEEE C-37.90A-1978
5. Manufacturer shall provide copies of test reports upon request.

H. Manufacturer

1. The transfer switch manufacturer shall employ a nationwide factory-direct, field service organization, available on a 24-hour a day, 365 days a year, call basis.
2. The manufacture shall include an 800 telephone number, for field service contact, affixed to each enclosure.
3. The manufacturer shall maintain records of each transfer switch, by serial number, for a minimum 20 years.

2.4 FINISHES

- A. Enclosures: Manufacturers standard enamel over corrosion-resistant pretreatment and primer.

2.5 SOURCE QUALITY CONTROL

- A. Factory Test Components, Assembled Switches, and Associated Equipment: Ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Floor-Mounted Switch: Level and anchor unit to floor.
- B. Annunciator and Control Panel Mounting: Flush in wall, unless otherwise indicated.

- C. Identify components according to Section “Basic Electrical Materials and Methods.”
- D. Identify components according to Section “Electrical Identification.”

3.2 WIRING TO REMOTE COMPONENTS

- A. Match type and number of cables and conductors to control and communications requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.

3.3 CONNECTIONS

- A. Ground equipment as indicated and as required by NFPA 70.

3.4 FIELD QUALITY CONTROL

- A. Testing: Test transfer-switch products by operating them in all modes. Perform tests recommended by manufacturer under the supervision of manufacturer’s factory-authorized service representative. Correct deficiencies and report results in writing. Record adjustable relay settings.
- B. Testing: Perform the following field quality-control testing under the supervision of the manufacturer’s factory-authorized service representative in addition to tests recommended by the manufacturer:
 - 1. Before energizing equipment, after transfer-switch products have been installed:
 - a. Measure insulation resistance phase-to phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Meet manufacturer’s specified minimum resistance.
 - b. Check for electrical continuity of circuits and for short circuits.
 - c. Inspect for physical damage; proper installation and connection; and integrity of barriers, covers, and safety features.
 - d. Verify that manual transfer warnings are properly placed.
 - e. Perform manual transfer operation.
 - 2. After energizing circuits, demonstrate interlocking sequence and operational function for each switch at least three times.
 - a. Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.
 - b. Simulate loss of phase-to-ground voltage for each phase of normal source.
 - c. Verify time-delay settings.
 - d. Verify pickup and dropout voltages by data readout or inspection of control settings.
 - e. Test bypass/isolation unit functional modes and related automatic transfer-switch operations.
 - f. Perform contact-resistance test across main contacts and correct values exceeding 500 microhms and values for one pole deviating by more than 50 percent from other poles.
 - g. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown sequence.

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- C. Ground-Fault Tests: Coordinate with testing of ground-fault protective devices for power delivery from both sources.
 - 1. Assist in verifying grounding connections and locations and ratings of sensors.
 - 2. Assist in observing reaction of circuit-interrupting devices when simulated fault current is applied at sensors.
- D. Coordinate tests with tests of generator plant and run them concurrently.
- E. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.

3.5 CLEANING

- A. After completing equipment installation, inspect unit components. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.
- B. Clean equipment internally, on completion of installation, according to manufacturers written instructions.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owners personnel to adjust, operate, and maintain transfer switches and related equipment as specified below:
 - 1. Coordinate this training with that for generator equipment.
 - 2. Train Owners maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment.
 - 3. Review data in maintenance manuals. Refer to Division 1 Section "Contract Closeout."
 - 4. Review data in maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data."
 - 5. Schedule training with Owner, through Architect, with at least seven days advance notice.
 - 6. Provide a minimum of four hours of instruction.

END OF SECTION 263620

SECTION 28 31 01

FIRE EMERGENCY VOICE/ALARM COMMUNICATION SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Installation of a Fire Emergency Voice/Alarm Communication System for detection, pull stations, monitoring and control of any necessary HVAC equipment, and the new sprinkler risers and associated components. The new Fire Alarm EVACS will report to an off-site monitoring station.
- B. The Contractor is responsible for all permits, design, labor, materials, and equipment for the following:
 - 1. Installation of a new Fire Emergency Voice/Alarm Communication System in order to monitor and/or control new sprinkler assemblies, HVAC, and other necessary components.
 - 2. Provide equipment, materials, installation, workmanship, inspection, and testing in strict accordance with the required and advisory provisions of NFPA 72, ISO 7240-16, IEC 60268-16, except as modified herein. The system layout on the drawings show the intent of coverage and are shown in suggested locations. Submit plan view drawing showing device locations, terminal cabinet locations, junction boxes, other related equipment, conduit routing, wire counts, circuit identification in each conduit, and circuit layouts for all areas. Drawings shall comply with the requirements of all applicable codes. Final quantity, system layout, and coordination are the responsibility of the Contractor.
 - 3. Provide a dedicated 120 VAC power circuit for each Fire Alarm Control Unit (FACU), NACX, and other control units complete with a lock-on device at the circuit breaker of the electrical panel.
 - 4. Fire caulk and patch penetrations of all rated assemblies.
 - 5. Include in the system wiring, raceways, pull boxes, terminal cabinets, outlet and mounting boxes, control equipment, alarm, and supervisory signal initiating devices, alarm notification appliances, supervising station Fire Emergency Voice/Alarm Communication System and other accessories and miscellaneous items required for a complete operating system even though each item is not specifically mentioned or described. Provide system[s] complete and ready for operation.

1.2 REFERENCES

- A. National Fire Protection Association (NFPA):
 - 1. NFPA 70, National Electrical Code, 2014 edition.
 - 2. NFPA 72, National Fire Alarm Code, 2010 edition.
 - 3. NFPA 90A, Installation of Air-Conditioning and Ventilating Systems, 2012 edition.
- B. International Code Council (ICC):
 - 1. International Building Code (IBC), 2015 edition

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2. International Fire Code (IFC), 2015 edition
 3. International Mechanical Code (IMC), 2015 edition
- C. State Licensing Regulations:
1. Texas Insurance Code, Chapter 6002 (formerly Article 5.43-2), Fire Detection and Alarm Device Installation & 28 TAC § 34.600 the Fire Alarm Rules, summer 2014.
 2. Texas Accessibility Standards – 2012, effective March 15, 2012.
- D. Equipment Listings:
1. FM Global (FM) Fire Protection Approval Guide, 2015 edition.
 2. Underwriters Laboratories (UL) Fire Protection Equipment Directory, 2015 edition.
 3. Other Nationally Recognized Testing Laboratory (NRTL).
- E. Code Conflicts:
1. Any conflicts between the referenced codes and this specification shall be brought to the attention of the Fire Protection Engineer of Record and Contractor for interpretation.

1.3 DEFINITIONS

- A. Owner shall mean San Antonio Housing Authority (SAHA)
- B. Architect shall mean Raba Kistner, Inc. (RKCI)
- C. Fire Protection Engineer of Record or FPE shall mean Fire Protection Consulting Group, LLC (FPCG).
- D. Contractor shall mean a licensed General Contractor awarded the project who is responsible for all Work required as part of this project.
- E. Sub-contractor or installing contractor shall mean a Fire Sprinkler Contractor licensed in the State of Texas to design, install, and test fire sprinkler systems.
- F. NICET shall mean National Institute for Certification in Engineering Technologies.
- G. Authority Having Jurisdiction (AHJ): City of San Antonio Development Services (CoSA).
- H. Approved: Acceptable to the Authority Having Jurisdiction and FPE.
- I. Listed: Equipment or materials included in a list published by an organization that is acceptable to the AHJ, and concerned with evaluation of products that maintains periodic inspection of production of listed products whose listing states that either the equipment or material meets appropriate designated standards or has been tested and found suitable for a specified purpose..

1.4 SYSTEM DESCRIPTION

- A. The addressable Fire Emergency Voice/Alarm Communication System shall provide initiation, detection, supervision, alarm, control and notification. The FACP system status shall be displayed

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at the panel, remote annunciator. Refer to the fire alarm contract drawings for the system's original sequence of operation matrix. The Fire Emergency Voice/Alarm Communication System components shall be at minimum:

1. Addressable monitor modules
 2. Addressable control modules
 3. Addressable smoke detectors
 4. Addressable heat detectors
 5. Addressable duct detectors
 6. Addressable pull stations
 7. Isolation modules
 8. Notification devices shall be speakers, strobes, or a combination device
 9. Remote Central Station dialer, either phone line or cellular transmission
- B. Signal Line Circuits dedicated for Smoke Control are to be Class A, Pathway Survivability Level 1, and Shared Pathway Level 3.
- C. Signal Line Circuits for other fire alarm devices are to be Class A, Pathway Survivability Level 0, and Shared Pathway Level 3.
- D. Notification Appliance Circuits are to be Class B, Pathway Survivability Level 0, and Shared Pathway Level 3.
- E. Control Circuits are to be Class B, Pathway Survivability Level 0, and Shared Pathway Level 3.
- F. Items 1.4.C through 1.4.E shall have their respective survivability levels increased to level 1 if circuits extend between floors. Signaling Line Circuit shall have isolation modules at each level and per manufacturer instructions.
- G. Network Circuits are to be Class A, Survivability Level 1, and Shared Pathway Level 3.
- H. Alarm signals arriving at the FACP shall not be lost following a primary power failure (or outage) before the alarm signal is processed and recorded.
- I. All fire alarm cable attached to terminals shall be identified with legibly printed ID labels.

1.5 SUBMITTALS

- A. All submittals must be reviewed and approved by the Fire Protection Engineer Design of Record prior to submitting to City of San Antonio for a permit. Sub-contractor shall not commence installation work without explicit authorization by the Contractor.
1. Submittals shall include the following documentation and shall comply with the project submittal requirements:
 - a. Equipment Books: A clearly annotated document that includes complete manufacturer's information on every component proposed to be utilized. A complete system bill of material is required.

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- b. Shop Drawings: Shop drawings shall be drawn in AutoCAD format to an indicated scale and plotted on sheets of uniform size with a plan of each floor. Drawings shall include an input / output matrix of sequence of operations. Drawings shall show the location of the fire alarm control panels, initiating devices and notification appliances. Drawings must also show the end-of-line resistors, power supply connections, and other field terminations which may be necessary for auxiliary control and supervisory functions. The submittal shall include complete floor plan drawings locating all system devices and appliances including wire routing, line size, conduit size and routing. Provide a “to scale” detail of the FACU wiring and circuit connections at the panel. Control units and equipment must be shown on the floor plan drawings (Contractor shall follow NFPA 72 Section A.10.18.1.2 list of information).
- c. Riser Diagram and Associative Schematics: Show circuit hierarchy, device and appliance locations on their respective circuit, size of conduit where required, gauge of conductors, wire type, number of conductors, and interconnection of components. Include all pertinent schematics and diagrams which may clarify system operation.
- d. Load Calculations: Provide load calculations indicating that SLC, NAC, and amplifier circuits are limited to 80% of their capacity during initial installation.
- e. Battery Calculations: Submit back-up battery calculations verifying each set of batteries provided exceeds supervisory and alarm requirements when manufacturer-suggested factors such as aging are included.
- f. Provide required battery capacity for 48 hours of quiescent loading followed by a 15 minute period of full-load (maximum system current draw) alarm condition.
- g. Voltage Drop Calculations for Signaling Circuits: Indicate that the supplied voltages meet or exceed manufacturer’s listed minimum operating voltage for each appliance. Beginning with a panel voltage of 20.4 VDC, the last device or appliance shall not have less than the manufacturer’s listed minimum voltage required for approved operation. The minimum voltage at the last device or appliance shall not be less than 16 VDC.
- h. Five sets of all documentation shall be submitted to the Contractor for distribution as follows:
 - 1) Two complete copies of the submittal shall be provided to the Fire Protection Engineer Design of Record, one for review and comment and one retained for record. One complete copy of the submittal will be retained by the Owner for record.
 - 2) The remaining two copies of the submittal shall be for the use of the Contractor.

B. CLOSE OUT DOCUMENTATION AND TRAINING

1. The Owner, Contractor, Fire Protection Engineer Design of Record shall each be provided with the following documents and all project record documents and manuals:
 - a. As-built drawings.
 - b. Electronic set of AutoCAD based drawings on Windows formatted CD-ROM. AutoCAD release 2013 format.
 - c. Operation and maintenance manuals. The data shall include a plain language description of the system and operating sequence, manufacturer’s technical data, and data sheets for all installed equipment.

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- d. Original test certificates and approvals by the AHJ.
- e. Programmer's disk on a CD-ROM disk(s) compatible with Microsoft Windows operating system. This disk(s) must contain the complete and final database and all other programming data for the fire alarm system.
- f. A manufacturer's representative shall provide training and instruction for operation of the Fire Emergency Voice/Alarm Communication System as specified in Division 01 and shall include the following:
- g. Training sessions for central staff, maintenance personnel, and security police which are attendant to Fire Emergency Voice/Alarm Communication System performance addressing basic system operation and appropriate response. One session shall be conducted after system installation and acceptance when supervisory personnel are available. Another session shall be conducted two months after the first session as a refresher course and follow-up. The scheduling of the training sessions shall be coordinated through the Owner's Representative. Provide advance notice of scheduled training sessions.
- h. The operation and maintenance manuals may serve as the training aids.

1.6 QUALITY ASSURANCE

A. QUALIFICATIONS

- 1. Work shall be performed by a fire alarm contractor licensed by the Texas Department of Insurance and the State Fire Marshal's Office.
- 2. Design shall be performed by one of the following: a Fire Protection Engineer licensed in the State of Texas or a NICET Level III or IV fire alarm engineering technician also licensed as a Fire Alarm Planning Superintendent with the Texas Department of Insurance.
- 3. Installation shall be under the supervision of the Alarm Planning Superintendent licensed in Texas.
- 4. The Contractor shall be fully responsible to ensure that all designs meet the construction specifications and documents, applicable codes and standards, and shall adhere to those codes and standards mandated by the Texas Department of Insurance for a fully licensed fire alarm systems contractor.

B. PRE-INSTALLATION CONFERENCE

- 1. Prior to installation, the Contractor shall arrange a pre-installation conference with the Fire Protection Engineer Design of Record and Owner to identify potential installation issues and conflicts.

1.7 DELIVERY, STORAGE, AND HANDLING

A. ACCEPTANCE AT SITE

- 1. Contractor shall inspect all material upon arrival at the site. Any defective or damaged material shall be immediately removed from site and replaced with properly operating and serviceable equipment.

B. STORAGE AND PROTECTION

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1. Contractor shall provide for secure storage on the site at a location approved by the Owner.

1.8 SCHEDULING AND SEQUENCING

- A. All sequencing and scheduling of installation, inspections, testing, and placing system in full operation shall be coordinated by the Contractor. Submit a schedule for completion of all work to the Owner for approval.

1.9 WARRANTY

- A. All workmanship, materials, and equipment furnished under this contract shall be free from defects in workmanship and materials under normal use and service for a period of one (1) year from the date of acceptance of the entire replacement Fire Emergency Voice/Alarm Communication System by the AHJ. Any equipment or materials shown to be defective shall be repaired or replaced during working hours allowed in this specification or at a time convenient to the owner and at no cost to the Owner.
- B. The equipment manufacturer shall be represented by a local service company, and the name shall be furnished to the Owner.

1.10 MAINTENANCE

- A. Contractor shall include a maintenance contract for the term of one (1) year beginning from the date of final acceptance by the Owner. Inspection, testing, and maintenance shall be performed in accordance with NFPA 72 guidelines.
- B. Provide the services of a factory trained and authorized technician to perform all system software modifications, upgrades, or changes.
- C. Contractor is to furnish extra materials as follows:
 1. Notification Appliances: Quantity equal to 5% (no less than two units of each type of appliance).
 2. Heat Detectors: Quantity equal to 5% of each type installed (no less than two units of each type installed).
 3. Smoke Detectors: Quantity equal to 5% of each type installed (no less than two units of each type installed).
 4. Manual Pull Boxes: Quantity equal to 5% of each type installed (no less than two units of each type installed).
 5. Modules: Quantity equal to 5% of each type installed (no less than two units of each type installed).
 6. Keys / Tools: Ten sets for access to all locked and tamperproof components.

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1.11 COMMISSIONING

- A. System acceptance testing and commissioning, performance verification and acceptance testing shall be in accordance with requirements of Chapter 14 in NFPA 72.
- B. Contractor shall employ factory-trained technicians on-site to conduct the final system check and to ensure the system's integrity.

1.12 MONITORING

- A. The fire alarm sub-panels' hardware/software/firmware shall be installed and programmed to transmit system status to an off-site Supervising Station.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers of fire alarm equipment and products shall not be limited so long as they comply with all other requirements of this specification.

2.2 MATERIALS

- A. Material and equipment shall be standard products listed and FM approved for use with the FACU, existing, or new equipment on campus monitoring the new panel, and with the central station monitoring equipment.
- B. All component parts of the system shall be listed or labeled by UL and approved by FM for use as part of a protective signaling system meeting NFPA 72. Contractor shall submit proof of such conformance. Field modification of components shall be prohibited.
- C. All equipment and components shall be installed in strict compliance with manufacturers' instructions and recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, approved back boxes, approved installation methods, etc., before beginning system installation.

2.3 COMPONENTS

A. POWER CABLE AND SYSTEM WIRING

1. 120 VAC power cables shall be at a minimum #12 AWG stranded copper in EMT. Power cable shall have three conductors, including ground. Refer to Specification 260050 for more information.
2. New SLC wire shall be Red Jacket, minimum #16 AWG FPLP, solid copper, two conductor, twisted cable.
3. New NAC-Visual wire shall be White Jacket, minimum #14 AWG FPLP, solid copper, two conductor, twisted cable for Visual devices.

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4. New NAC-Voice wire shall be Blue Jacket, minimum #16 AWG OAS FPLP, solid copper, two conductor, twisted cable for Speaker devices.
5. New IDC wire shall be Red Jacket, minimum #18 AWG FPLP, solid copper, two conductor twisted cable.
6. New Network cable shall be Red Jacket, minimum #16 AWG FPLP, solid copper, two conductor, twisted cable. Fiber Optics may be substituted; however, fiber from other trades is not available.

B. MAIN FIRE ALARM CONTROL UNIT

1. Intelligent addressable control panel with all electronic components and modules required to monitor, supervise, annunciate power and control all devices, appliances, and sub-panel functions. This panel shall, at a minimum, include the following features:
 - a. UL Listed, FM approved, surface mount, key locked cabinet. Visible control panel with cabinet door closed.
 - b. 24 VDC system operation.
 - c. Networked, to provide peer-to-peer capability
 - d. Alphanumeric display of alarm, trouble, and supervisory conditions on a minimum 80-character LCD display.
 - e. A key membrane keypad for programming and to control all system functions.
 - f. A minimum two levels of password protection shall be provided. The first level shall be used for status level changes such as point / zone disable or manual on / off control commands by the Owner. The second level shall be used for changes to the system configuration of supervision, initiation, notification, and control by the Sub-contractor.
 - g. Minimum of one RS-232D ports shall be provided.
 - h. The system shall have a “walk test” feature which can be initiated by zone and globally.
 - i. Automatic drift compensation for all smoke detection devices.
 - j. The FACP shall have the capacity to store 400 system events in chronological order of incidence in a non-volatile buffer memory. Events shall be time and date stamped. Access to event history will require a five digit, level two password security code.
 - k. Field programmable without the use of special tools, PROM programming or replacement chips. Programming mode shall be achieved after the acceptance of a five-digit level two password security code. Laptop computers may be considered as meeting the “field- programmable” requirement, provided the computer and required software are included in the contract.
 - l. Keys which manipulate the Fire Emergency Voice/Alarm Communication System shall have access level program features to prevent unauthorized silencing or resetting.
 - m. Integrated dialer capable of transmitting Contact ID of all local and network activity to Central Station.

C. SMOKE DETECTION DEVICES

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1. Spot Type Detector: Photoelectric addressable smoke detector shall include a separate twist lock / plug-in base. Removal of the detector head shall cause a trouble condition at the FACP. Smoke detector head shall be easily removable and replaceable. The device shall include 1 LED that indicates normal operation and alarm status.

D. DUCT SMOKE DETECTION DEVICES

1. Duct Smoke Detector: Photoelectric addressable duct smoke detector shall include a separate duct housing to be mounted on the duct. Removal of the detector head shall cause a trouble condition at the FACP. Smoke detector head shall be easily removable, replaceable, and of the same type as the spot type detector required for 2.3.C.1. The device shall include 1 LED that indicates normal operation and alarm status.

E. HEAT DETECTION DEVICES

1. Spot Type Detector: Rate of Rise and 135° Fixed Temp addressable heat detector shall include a separate twist lock plug-in base. Removal of the detector head shall cause a trouble condition at the FACP. Heat detector head shall be easily removable and replaceable. The device shall include 1 LED that indicates normal operation and alarm status.

F. NOTIFICATION APPLIANCES

1. Visible Appliance: xenon flash tube and lens reflector systems provided in White lexan (or equivalent) cases with raised Red lettering stating "FIRE". Candela rating shall be labeled on the appliance and visible so as to not require the removal of the appliance. Candela rating shall be listed for use in supervised circuits.
2. Speakers: Operate on 25 VRMS or 70.7 VRMs, with field-selectable output taps from 0.25 to 2.0 watts. Nominal sound output of 84 dBA at 10 feet (3 m). Frequency Response: Minimum of 400 Hz to 4,000 Hz.). Low Frequency Response per NFPA 72, 18.5.4.3 for sleeping rooms. Sealed to protect speaker cone from damage and dust.
3. Speaker / Visible Appliance: Shall be a combination unit meeting 2.3.F.1 and 2.3.F.2.
4. All speakers shall utilize screw terminals for termination of all field wiring and be capable of producing low frequency per NFPA 72, 18.5.4.3.
5. Sounder Bases: Nominal sound output of 96 dBA at 10 feet (3 m). Low Frequency Response per NFPA 72, 18.5.4.3. Shall be compatible with Smoke Detector as a twist lock / plug-in base. Loss of power to sounder base shall cause a trouble condition at the FACP.

G. AMPLIFIERS, PREAMPLIFIERS, TONE GENERATORS

1. Provide adequately sized amplifiers for the system located throughout the facility while maintaining 20% spare capacity on all amplifiers.
2. The system shall have the capability to manually operate and control all speakers located throughout the facility.
3. Amplifiers shall utilize computer grade solid state components and shall be provided with output protection devices sufficient to protect the amplifier against any transient up to 10 times the highest rated voltage in the system.
4. Equip each system with separate inputs for the tone generator, digitalized voice driver and panel mounted microphone [Public Address Paging Function (where allowed)]. Microphone inputs shall be of the low impedance, balanced line type. Both microphone and tone generator input shall be operational on any amplifier.

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5. The tone generator shall be of the modular, plug-in type with securely attached labels to identify the component as a tone generator and to identify the specific tone it produces. The tone generator shall produce a code 3 temporal tone and shall be constantly repeated until interrupted by either the digitalized voice message, the microphone input, or the alarm silence mode as specified. The tone generator shall be single channel with an automatic backup generator per channel such that failure of the primary tone generator causes the backup generator to automatically take over the functions of the failed unit and also causes transfer of the common trouble relay.
6. Each amplifier shall be constantly supervised for any condition that could render the amplifier inoperable at its maximum output. Failure of any component shall cause automatic transfer to a designated backup amplifier, illumination of a visual "amplifier trouble" indicator on the control panel, appropriate logging of the condition on the system printer, and other actions for trouble conditions as specified.

H. NETWORK ANNUNCIATOR

1. Locate the network annunciator in the Security Office. Mount the consoles so that the display is no higher than **60 inches** above the floor. Network Annunciator to display all network activity but limit network control capability to "Acknowledge" only.

I. BATTERIES

1. The secondary power supply from batteries shall have sufficient capacity to power the Fire Emergency Voice/Alarm Communication System under non-alarm condition for a minimum of 48 hours and then shall be capable of operating the system during alarm condition for a period of 15 minutes at maximum connected load in accordance with NFPA 72 Section 10.5.6.3.1.
2. Marking of batteries shall be in conformance with NFPA 72 Section 10.5.9.1.
3. The batteries are to be completely maintenance free. Fluid level checks for refilling, spills, and leakage shall not be required.

J. MANUAL PULL STATION

1. Addressable, non-coded, and dual action. Wall mounted on standard electrical box listed for use by the manufacturer. The operating handle shall be recessed to prevent accidental operation. Box shall be high- impact red Lexan and provide visual indication the station has been operated. Reset shall require a key. Break-glass-front stations are not permitted; however, a pull lever break- glass-rod type is acceptable.

K. ISOLATION MODULES

1. Shall be provided to automatically isolate wire-to-wire short circuits on an SLC loop.
2. Shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC Loop.
3. Shall automatically reconnect the isolated section of the SLC loop. It shall not be necessary to replace or reset an Isolator Module after its normal operation.
4. Shall provide a single LED which shall flash to indicate that the Isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.

L. MONITOR MODULES

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1. Addressable. Shall provide supervision of conventional devices and IDC circuits.
2. Provide status feedback of peripheral equipment as needed.

M. CONTROL / RELAY MODULES

1. Addressable control modules shall be provided to connect control and supervisory devices. These modules are intended for interfacing with elevator and HVAC control functions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. The Contractor must field verify all conditions prior to installation. Any inquiries or discrepancies shall be addressed to the Fire Protection Engineer Design of Record.

3.2 INSTALLATION PRACTICE AND PROCEDURES

- A. The Contractor shall comply with all applicable practices and procedures as required per the referenced codes, standards, and the AHJ to ensure the proper installation of a fully operational, compliant system. All work shall be coordinated with representatives of the Owner at least ten (10) days prior to the scheduled start.
- B. Prior to commencing any work, the Contractor shall inspect all areas where work is to be performed. The Contractor shall comply with all appropriate safety guidelines and precautions to accomplish the work without injury to personnel or damage to any building components or contents.
- C. All equipment shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings) with approved fastening systems or methods.
- D. All Fire Emergency Voice/Alarm Communication System devices, appliances, and control panels shall be mounted per manufacturer's instructions.
- E. Smoke detectors shall not be installed until the area of installation is free of debris and construction dust or all detectors in said area shall be replaced. Cleaning of said detectors will not be sufficient to meet the intent of this section.
- F. All junction boxes above ceiling shall be accessible. Access panels shall be provided when above hard ceilings.

3.3 PRIMARY POWER

- A. The primary power for the FACU must be connected to a dedicated 120 VAC power circuit breaker which can only be accessed by authorized personnel or provided with a "lock-on" device which must be removed before the circuit can be de-energized. The circuit breaker must be clearly and indelibly labeled in color red, "FIRE ALARM CIRCUIT CONTROL". Primary electrical power modifications shall be performed by the Contractor under the direction of the installing contractor.

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3.4 WIRING AND TERMINATION METHODS

- A. All wiring associated with the Fire Emergency Voice/Alarm Communication System including power, SLC, IDC, NAC, and auxiliary functions shall be installed in accordance with the respective articles of the National Electric Code, NFPA 70 and the manufacturer's requirements.
- B. Fire alarm conductor terminations in the control panel are to be made on terminal strips with separate points for each conductor. All strips and cable shall be numbered or identified with heat shrink labels. Set up termination of cabling and wire racks so that the system may be easily serviced. Ensure that all electrical cable terminations are suitable for the wire gauge being used. All conductors must be splice free. Wire nuts and crimp connectors are prohibited.
- C. Wire which penetrates fire rated wall assemblies shall be properly sealed with an approved fire-stop material as specified by the manufacturer for use with the specific wire and construction material.
- D. Wire shall be properly supported in accordance with NFPA 70 and the manufacturers' guidelines. Wiring shall not be supported by suspended ceilings or other similar fixtures and shall be provided with dedicated support wires, straps, guides, etc.

3.5 DEVICE AND APPLIANCE INSTALLATION

- A. Install all initiating and supervisory devices where indicated on contract drawings and required by applicable codes.
- B. Spot type smoke detection is required at the FACP. Additional spot type smoke detectors are required in the location of any remote power supplies which serves the fire alarm system.
- C. Install spot type detection for elevator control as required by ANSI 17.1 and where indicated on contract drawings.
- D. Install duct detectors per manufacturer's instructions and the International Mechanical Code. Refer to mechanical contract drawings for quantities and locations.
- E. Install CO detectors per manufacturer's instructions and as required by all applicable codes.

3.6 FIELD QUALITY CONTROL

- A. The Contractor shall be completely responsible for the fire alarm systems described in this specification meeting the requirements found in NFPA 72 Chapter 14, Installation, Testing, and Maintenance, and herein described.
- B. The Fire Protection Engineer Design of Record, or his designee, shall be notified of all inspection and test dates in advance and shall be present at such testing. Contractor shall be responsible for coordinating pretesting and final inspection and testing with the Fire Protection Engineer Design of Record and AHJ. As-built drawings, testing and inspection certificates shall be furnished during this event and no later than fourteen (14) days after this event. Acceptance tests will be ruled invalid if not witnessed by the AHJ or otherwise waived by the Fire Protection Engineer Design of Record or Owner.

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3.7 PROGRESS INSPECTIONS

- A. Rough-in: Contractor shall contact the Fire Protection Engineer Design of Record at the rough-in stage to coordinate a progress inspection.
- B. Final testing: Contractor shall contact the Fire Protection Engineer Design of Record when the system has been fully installed and is ready for final inspection and testing.

3.8 PRE-TESTING

- A. A pretest sequence must be performed before final acceptance of the system. The pretest shall include:
 - 1. Verifying no unwanted voltages exist between circuit conductors and ground.
 - 2. Conduct insulation testing (using a Megohmmeter) to assess insulation performance. Contractor shall provide a report of testing on each circuit.
 - 3. Record the short circuit resistance of each circuit pair and record "Closed loop" readings
 - 4. Test all circuits for proper signal transmission under open circuit conditions.
 - 5. Test each initiation and notification device – test smoke detectors with approved test agents or actual byproducts of combustion. Systematically verify the performance of the FACU to ensure the indicating lights, displays, signal tones, and annunciators are functioning properly.
 - 6. Test both primary and secondary power sources.
 - 7. Provide a letter certifying the pretesting has been completed. Indicate in the letter any corrective actions that were found / corrected during the pre-testing phase.

3.9 FINAL TESTING

- A. Final testing advance notice must be given to the Fire Protection Engineer Design of Record.
- B. The final testing sequence will be at the discretion of the Fire Protection Engineer Design of Record, AHJ, and Owner and will include the items listed under the pre- testing section.

3.10 ADJUSTING

- A. Should discrepancies or installation deficiencies be uncovered by field quality control measures, the Contractor shall modify the work as necessary to meet all project requirements as originally scheduled unless otherwise modified by the Owner.

END OF SECTION 283100

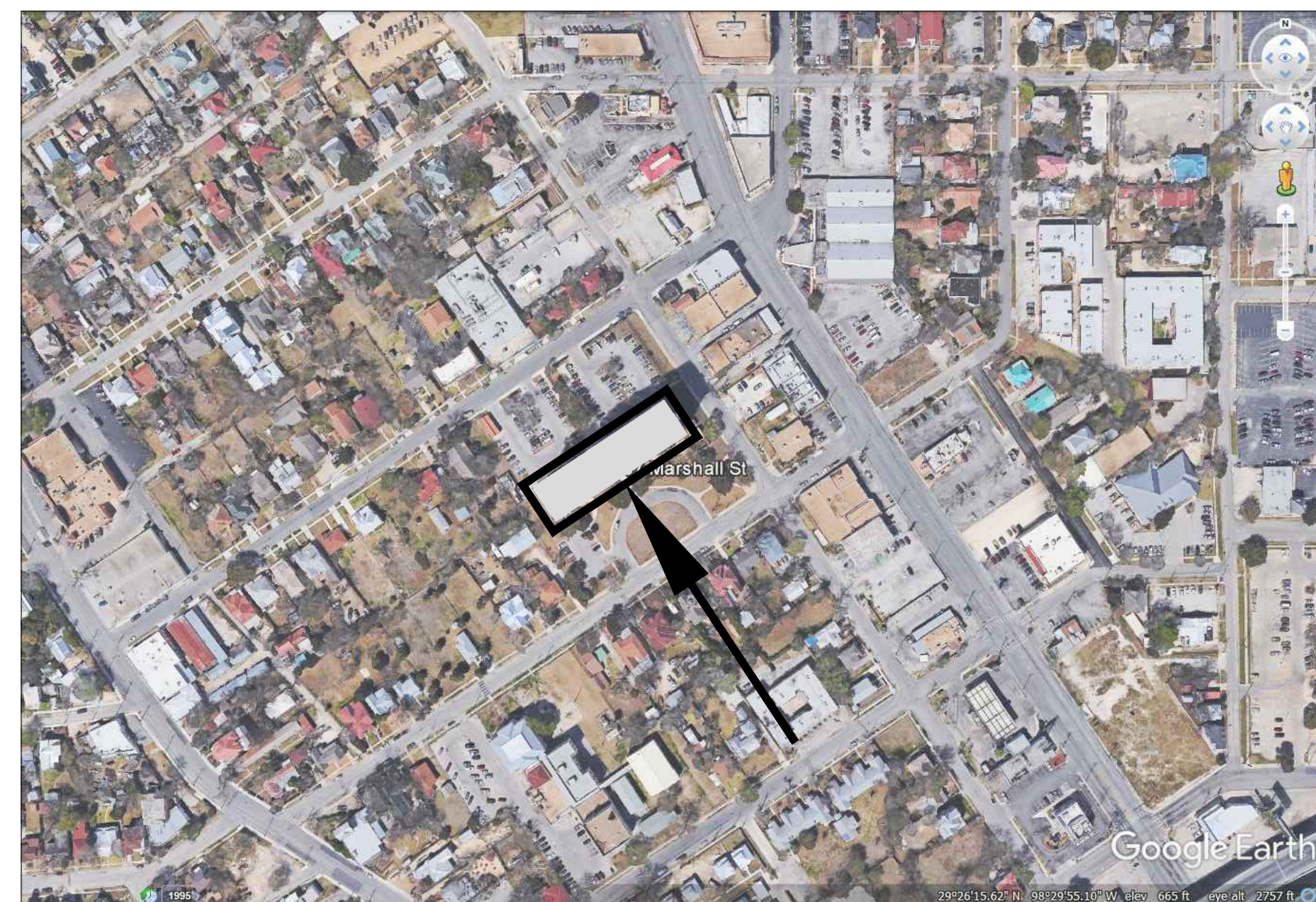
SAN ANTONIO HOUSING AUTHORITY

VILLA TRANCHESE APARTMENTS

307 MARSHALL STREET

SAN ANTONIO, TEXAS 78212

PHASE B



1 AREA MAP
 NTS
 TRUE NORTH



2 SOUTH ELEVATION PHOTO
 NTS

SCOPE OF WORK

THE SCOPE OF WORK IS DEFINED BY THE CONTRACT DOCUMENTS AND CONSISTS OF THE FOLLOWING:

- ELECTRICAL SELECTIVE DEMOLITION.
- NEW EMERGENCY GENERATOR AND ASSOCIATED ELECTRICAL WORK INCLUDING AUTOMATIC TRANSFER SWITCHES. EXISTING GENERATOR RELINQUISHED TO OWNER.
- FIRE ALARM SYSTEM REPLACEMENT TO INCLUDE, BUT NOT BE LIMITED TO, APARTMENT UNIT SMOKE DETECTION/LOW FREQUENCY NOTIFICATION, BUILDING WIDE VOICE EVACUATION AND MONITORING SPRINKLER SYSTEM AND FIRE PUMP DEVICES.
- NEW WET-PIPE SPRINKLER PROTECTION SYSTEM THROUGHOUT THE BUILDING INCLUDING NEW STANDPIPE WITH FLOW CONTROL VALVES AND FIRE PUMP.
- NEW DOUBLE-CHECK BACKFLOW PREVENTER IN NEW VAULT.
- FIRESTOPPING OF NEW AND EXISTING DUCT/PIPE/CONDUIT PENETRATIONS THROUGH FIRE RATED ASSEMBLIES IN THE BASEMENT AND PENTHOUSE.
- FIRESTOPPING OF NEW DUCT/PIPE/CONDUIT PENETRATIONS THROUGH FIRE RATED ASSEMBLIES FROM THE FIRST FLOOR TO THE ELEVENTH FLOOR.
- DEMOLITION OF EXISTING CMU WALLS AND INSTALLATION OF FIRE RATED CMU ENCLOSURE FOR NEW FIRE PUMP.
- REMOVE EXISTING WINDOW AIR CONDITIONERS ON FIRST LEVEL AND RELINQUISH TO OWNER. RE-GLAZE OPENINGS TO MATCH EXISTING WINDOW TREATMENTS.
- HARDWARE RETROFIT OF MISCELLANEOUS BUILDING DOORS AND PREMISES GATES FOR CODE REQUIRED EGRESS.
- PAINTED DRYWALL ENCLOSURES FOR SPRINKLER PIPING CROSSING PUBLIC CORRIDORS.
- REMOVAL AND REINSTALLATION OF EXISTING CEILING PANELS, DIFFUSERS/GRILLES AND LIGHT FIXTURES ON THE FIRST LEVEL FOR INSTALLATION OF NEW MECHANICAL, ELECTRICAL, FIRE ALARM AND FIRE SPRINKLER WORK.
- OTHER WORK AS DESCRIBED IN THE CONTRACT DRAWINGS AND SPECIFICATIONS OR REQUIRED BY WORK DESCRIBED TO PROVIDE A COMPLETE AND OPERABLE INSTALLATION.

BUILDING LIFE SAFETY INFORMATION

- BUILDING DATA**
 - BUILDING USE: RESIDENTIAL HOUSING
 - OCCUPANCY: R-2 HIGH RISE
 - SQFT: 310,860
- EXISTING FIRE ALARM INFORMATION**
 - FIRE PUMP MONITORING
 - SPRINKLER SYSTEM MONITORING
- PROPOSED FIRE PROTECTION INFORMATION**
 - DWELLING UNIT SMOKE DETECTION NOTIFICATION.
 - DWELLING UNIT AUDIO VISUAL OCCUPANT NOTIFICATION SYSTEM
 - BUILDING EMERGENCY EVACUATION SYSTEM
 - BUILDING SMOKE DETECTION SYSTEM
- EXISTING FIRE PROTECTION INFORMATION**
 - CLASS II STANDPIPE SYSTEM
 - SPRINKLERED BASEMENT
 - STANDPIPE FIRE PUMP
 - REMAINING OCCUPIED SPACES NOT SPRINKLERED
- PROPOSED FIRE PROTECTION INFORMATION**
 - NEW WET SPRINKLER STANDPIPE WITH INDIVIDUAL FLOOR CONTROL VALVES LOCATED IN CENTRAL STAIR.
 - NEW FIRE PUMP TO SERVE BOTH THE STANDPIPE AND BUILDING SPRINKLER SYSTEM.
 - NEW CLASS I STANDPIPE SYSTEM REPLACING THE EXISTING STANDPIPE AND THEIR EXISTING HOSE LINES AND CONNECTIONS.
 - PROVIDE A FULLY SPRINKLERED BUILDING.

WALL/FLOOR ASSEMBLY FIRE RATINGS

- BASEMENT** - ALL NEW & EXIST. DUCT, PIPE & CONDUIT PENETRATIONS THROUGH INTERIOR ASSEMBLIES SHALL BE FIRESTOPPED PER THE FOLLOWING ASSEMBLY RATINGS.
 - FIRE PUMP ROOM WALLS - 2 HR, UL937, DTL, 2, DWG. A2.
 - EXIST. MASONRY & CONCRETE WALLS - 2 HR.
- FIRST FLOOR** - ALL NEW & EXIST. DUCT, PIPE & CONDUIT PENETRATIONS THROUGH INTERIOR ASSEMBLIES SHALL BE FIRESTOPPED PER THE FOLLOWING ASSEMBLY RATINGS.
 - EXIST. GYP. BD. WALLS - NONRATED
 - EXIST. MASONRY & CONCRETE WALLS - 2 HR.
 - EXIST. CONCRETE FLOOR - 2 HR.
- 2ND THROUGH 11TH FLOORS** - ALL NEW PIPE & CONDUIT PENETRATIONS THROUGH INTERIOR ASSEMBLIES SHALL BE FIRESTOPPED PER THE FOLLOWING ASSEMBLY RATINGS.
 - EXIST. GYP. BD. WALLS SEPARATING APARTMENT UNITS FROM PUBLIC CORRIDORS - 1 HR.
 - EXIST. GYP. BD. WALLS SEPARATING APARTMENT UNITS (PARTY WALLS) - 1HR.
 - EXIST. GYP. BD. WALLS WITHIN APARTMENT UNITS - NONRATED
 - EXIST. MASONRY & CONCRETE WALLS - 2 HR.
 - EXIST. CONCRETE FLOOR - 2 HR.
- PENTHOUSE** - ALL NEW & EXIST. DUCT, PIPE & CONDUIT PENETRATIONS THROUGH INTERIOR ASSEMBLIES SHALL BE FIRESTOPPED PER THE FOLLOWING ASSEMBLY RATINGS.
 - ALL EXIST. WALL & FLOOR ASSEMBLIES - 2 HR.

NOTE: REFER TO ME, FS & FA DRAWINGS FOR FIRESTOPPING DETAILS.

DRAWING INDEX:

CS0-B	COVER SHEET
ME-0B	MEP SYMBOLS AND ABBREVIATIONS
MED-1B	MECHANICAL/ELECTRICAL SITE PLAN - DEMO
MED-2B	MECHANICAL/ELECTRICAL BASEMENT PLAN - DEMO
MED-3B	MECHANICAL/ELECTRICAL FIRST LEVEL (WEST END) PLAN - DEMO
ME-1B	MECHANICAL/ELECTRICAL SITE PLAN
ME-2B	MECHANICAL/ELECTRICAL BASEMENT PLAN
ME-3B	MECHANICAL/ELECTRICAL FIRST LEVEL (WEST END) PLAN
ME-4B	MECHANICAL/ELECTRICAL FIRST LEVEL (EAST END) PLAN
ME-5B	MECHANICAL/ELECTRICAL TYPICAL UPPER LEVELS 2-10 (EVEN) PLAN
ME-6B	MECHANICAL/ELECTRICAL TYPICAL UPPER LEVELS 3-11 (ODD) PLAN
ME-7B	ELECTRICAL ONE-LINE DIAGRAM
FA100	SITE PLAN AND GENERAL NOTES
FA200	BASEMENT AND FIRST LEVEL FLOOR PLAN
FA201	TYPICAL UPPER LEVEL AND ENLARGED UNIT PLAN
FA300	SEQUENCE OF OPERATIONS
FS100	SITE PLAN AND GENERAL NOTES
FS200	BASEMENT AND FIRST LEVEL PLANS
FS201	UPPER LEVEL AND ENLARGED UNIT PLAN
FS202	PENTHOUSE PLAN AND BUILDING SECTION
FS300	PUMP ROOM AND SPRINKLER DETAILS
FS301	SPRINKLER SYSTEM DETAILS
A0-B	SPECIFICATIONS, NOTES AND LEGENDS
A1-B	SITE PLAN
A2-B	BASEMENT PLAN
A3-B	FIRST LEVEL PLAN (WEST END)
A4-B	FIRST LEVEL PLAN (EAST END)
A5-B	TYPICAL UPPER LEVEL PLAN
A6-B	FIRST LEVEL REFLECTED CEILING PLAN (WEST END)
A7-B	FIRST LEVEL REFLECTED CEILING PLAN (EAST END)

PHASE B - FIRE PROTECTION SYSTEMS & LIFE SAFETY RENOVATIONS

RKCI PN: ASR17-019-00



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COVER SHEET
 San Antonio Housing Authority
PHASE B - Fire Protection Systems & Life Safety Renovations
 Villa Tranche Apartments
 307 Marshall Street
 San Antonio, Texas



REVISIONS:

No.	DATE	DESCRIPTION
0	05-22-18	BIDDING

PROJECT No.: ASR17-019-00

ISSUE DATE: 05-22-18

DRAWN BY:
 CHECKED BY:
 REVIEWED BY:

SHEET NO.
CS0-B

MECHANICAL PLUMBING AND ELECTRICAL SYMBOLS AND ABBREVIATIONS

(SOME SYMBOLS MAY NOT BE APPLICABLE TO THIS PROJECT)

SYMBOLS

ABBREVIATIONS

GENERAL

SYMBOL	DESCRIPTION
	DISCONNECT SWITCH
	COMBINATION MOTOR STARTER/DISCONNECT SWITCH
	GROUNDING REFERENCE POINT
	JUNCTION BOX, CEILING MOUNTED
	JUNCTION BOX, WALL MOUNTED
	TRANSFORMER AS INDICATED
	AUTOMATIC TRANSFER SWITCH
	EQUIPMENT CONNECTION
	MECHANICAL EQUIPMENT DESIGNATION. REFER TO MECHANICAL EQUIPMENT SCHEDULES.
	KEYED NOTE

RACEWAYS

	CONDUIT CONCEALED IN WALL OR CEILING WITH ONE PHASE, NEUTRAL AND GROUND CONDUCTOR UNLESS OTHERWISE NOTED
	CONDUIT UNDER FLOOR OR CAST IN STRUCTURE WITH ONE PHASE, NEUTRAL AND GROUND CONDUCTOR UNLESS OTHERWISE NOTED.
	SWITCH LEG
	BRANCH CIRCUIT HOMERUN SUBSCRIPT "P1A" INDICATES PANEL AND 2,4,6 INDICATES BREAKER POSITION. 3/4"C, 2#12 AND 1#12 GND. MIN.

PANEL AND RELATED ITEMS

	PANELBOARD (SEE SCHEDULE), SURFACE MOUNTED.
	PANELBOARD (SEE SCHEDULE), FLUSH MOUNTED.
	SWITCHBOARD OR DISTRIBUTION BOARD
	MOTOR CONTROL CENTER
	TRANSIENT VOLTAGE SURGE SUPPRESSOR.
	PLYWOOD TELEPHONE BACKBOARD. PROVIDE WALL MOUNTED WHITE PAINTED 4x8' PLYWOOD BACKBOARD, SURGE PROTECTION, SECONDARY GROUND, AND TWO QUAD RECEPTACLES AT THE BASE OF THE BACKBOARD.

OUTLETS

	IVORY SIMPLEX RECEPTACLE
	DUPLEX RECEPTACLE, 20A, 1P, IVORY WITH COVER PLATE
	DUPLEX RECEPTACLE: GF=GROUND FAULT INTERRUPTING, WP=WEATHERPROOF, T=TAMPER RESISTANT, IG=ORANGE ISOLATED GROUND, C=CLOCK OUTLET MOUNTED 18" BELOW CEILING, TV=TV RECEPTACLE WITH COMBINATION DUPLEX/COAX PLATE MOUNTED 76" AFF
	DOUBLE DUPLEX (QUADRUPLEX) RECEPTACLE, IVORY, WITH COVER PLATE
	RED DUPLEX RECEPTACLE WITH IVORY COVERPLATE CONNECTED TO EMERGENCY POWER BRANCH
	RED QUAD RECEPTACLE WITH IVORY COVERPLATE, CONNECTED TO EMERGENCY POWER BRANCH

SWITCHES

	SINGLE POLE SWITCH. LOWERCASE SUBSCRIPT INDICATES ASSOCIATED CIRCUITRY
	DOUBLE POLE SWITCH
	SWITCH WITH PILOT LIGHT IN HANDLE (ON LIGHTED UNLESS OTHERWISE NOTED)
	WEATHERPROOF SWITCH
	MANUAL MOTOR STARTER SWITCH (T=THERMAL OVERLOAD SIZED FOR MOTOR)

DISTRIBUTION

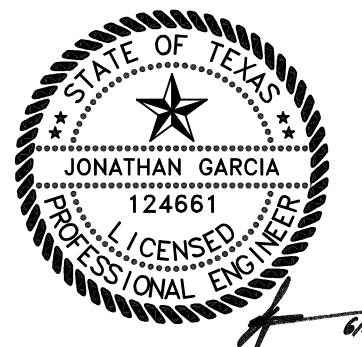
	MOLDED CASE CIRCUIT BREAKER
	DRAWOUT POWER CIRCUIT BREAKER AIR, VACUUM OR SF AS SPECIFIED.
	DISCONNECT SWITCH
	FUSIBLE DISCONNECT SWITCH
	TRANSFORMER
	SHIELDED ISOLATION TRANSFORMER
	VOLTMETER
	AMMETER
	VOLTMETER SELECTOR SWITCH
	AMMETER SELECTOR SWITCH
	SHUNT TRIP
	CT AND METER

SYMBOL	DESCRIPTION
	CALIBRATED BALANCING VALVE
	COMBINATION BALANCING AND FLOW METER
	VALVE, SELF-OPERATING
	PRESSURE REDUCING VALVE
	PRESSURE RELIEF VALVE
	TEMPERATURE AND PRESSURE RELIEF VALVE
	THREE WAY VALVE (AUTOMATIC)
	TWO WAY VALVE (AUTOMATIC)
	FLOW SWITCH
	STRAINER, WYE WITH DRAIN VALVE
	STRAINER - VERTICAL BASKET TYPE
	FLOOR DRAIN
	AUTOMATIC AIR VENT PIPED TO DRAIN
	MANUAL AIR VENT PIPED TO DRAIN
	GAUGE COCK
	FLOW VENTURI
	FLOW METER (PITOT OR ORIFICE)
	PRESSURE SWITCH
	GATE VALVE
	GLOBE VALVE
	BUTTERFLY VALVE
	HOSE VALVE (UTILITY PURPOSES)
	SWING CHECK VALVE
	CHILLED WATER SUPPLY
	CHILLED WATER RETURN
	SECONDARY CHILLED WATER SUPPLY
	SECONDARY CHILLED WATER RETURN

SYMBOL	DESCRIPTION
	NON-SLAM CHECK VALVE
	BALL VALVE
	BALL VALVE (MEMORY STOP)
	OUTSIDE STEM AND YOKE GATE VALVE
	PIPE RISE (R) OR DROP (D)
	FLOW - IN DIRECTION OF ARROW
	RISER DOWN (ELBOW)
	RISER UP (ELBOW)
	RISE OR DROP
	BRANCH CONNECTION OUT OF TOP
	BRANCH CONNECTION OUT OF BOTTOM
	BRANCH CONNECTION OUT OF SIDE
	CAP ON END OF PIPE
	PLUGGED TEE
	CONCENTRIC REDUCER
	ECCENTRIC REDUCER
	UNION (SCREWED)
	UNION (FLANGED)
	VALVE IN RISER (TYPE AS SPEC'D OR NOTED)
	PIPE ANCHOR
	PIPE GUIDE
	MECHANICAL GROOVED PIPE COUPLING
	PRESSURE GAGE WITH GAGE COCK
	THERMOMETER (STRAIGHT SCALE)
	THERMOMETER OR CONTROL TEST BULB WELL
	THERMOSTAT/TEMPERATURE SENSOR

A	AMPERE(S)	MDP	MAIN DISTRIBUTION PANEL
AC	ABOVE COUNTER	MECH	MECHANICAL
A/C	AIR CONDITIONING	MH	METAL HALIDE
AIC	AMPERE INTERRUPTING CAPACITY	MIN	MINIMUM
AFF	ABOVE FINISHED FLOOR	MLO	MAIN LUGS ONLY
AFG	ABOVE FINISHED GRADE	MTD	MOUNTED
AHU	AIR HANDLING UNIT	MTG	MOUNTING
AL, ALUM	ALUMINUM	MV	MERCURY VAPOR
ATS	AUTOMATIC TRANSFER SWITCH	MW	MICROWAVE
AWG	AMERICAN WIRE GAUGE	NA	NOT APPLICABLE
BLDG	BUILDING	NC	NORMALLY CLOSED
C	CONDUIT	NF	NONFUSIBLE
CB	CIRCUIT BREAKER	NL	NIGHT LIGHT
CCTV	CLOSED CIRCUIT TELEVISION	NO	NORMALLY OPEN
CFCI	CONTRACTOR FURNISHED, CONTRACTOR INSTALLED	OC	ON CENTER
CKT	CIRCUIT	OCFI	OWNER FURNISHED CONTRACTOR INSTALLED
COND	CONDUCTOR	OH	OVERHEAD
CPU	CENTRAL PROCESSING UNIT	P	POLE
CT	CURRENT TRANSFORMER	PA	PUBLIC ADDRESS
DCP	DATA COLLECTION PANEL	PB	PUSHBUTTON
DIA	DIAMETER	PBX	PRIVATE BUILDING EXCHANGE
DC	DISCONNECT	PC	PULL CHAIN
DIST	DISTRIBUTION	PIC	PHOTO CELL
DN	DOWN	PDP	POWER DISTRIBUTION PANEL
DWGS	DRAWINGS	PH, Ø	PHASE
EC	EMPTY CONDUIT	PNL	PANELBOARD
EF	EXHAUST FAN	PR	PAIR
EGMT	EQUIPMENT	PSI	POUNDS PER SQUARE INCH
EWC	ELECTRIC WATER COOLER	PWR	POWER
EXH	EXHAUST	QUAD	QUAD RECEPTACLE
EXP	EXPLOSION PROOF	REFR	REFRIGERATOR
EXTG	EXISTING	S	SECURITY
F/A, F.A.	FIRE ALARM	S.C.	SPLIT CIRCUIT
FLUOR	FLUORESCENT	SCC	STATUS COMMAND CENTER
FN	FULL NEUTRAL	SN	SOLID NEUTRAL
FT	FEET, FOOT	SPD	SURGE PROTECTION DEVICE
GALV	GALVANIZED	SOFT, □	SQUARE FOOT
GFCI	GROUND FAULT CIRCUIT INTERRUPTER	SW	SWITCH
GFI	GROUND FAULT INTERRUPTER	SWBD	SWITCHBOARD
GND	GROUND	TC	TIME CLOCK
GRD	GALVANIZED RIGID STEEL	TELE	TELEPHONE
HID	HIGH INTENSITY DISCHARGE	TSTAT	THERMOSTAT
HP	HORSEPOWER	TV	TELEVISION
HOA	HAND OFF AUTOMATIC	TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR
HPS	HIGH PRESSURE SODIUM	UON	UNLESS OTHERWISE NOTED
HVAC	HEATING/VENTILATING/AIR CONDITIONING	UPS	UNINTERRUPTABLE POWER SUPPLY
HZ	HERTZ	V	VOLTS(S)
ID	INSIDE DIAMETER	VEND	VENDING
IG	ISOLATED GROUND	VP	VAPOR PROOF
IMC	INTERMEDIATE STEEL CONDUIT	W	WIRE, WATT(S)
IN	INCHES	WP	WEATHERPROOF
INCd	INCANDESCENT	XFMR	TRANSFORMER
JB	JUNCTION BOX	XPD	TRANSPONDER
KV	KILOVOLT	Y	WYE
KVA	KILOVOLT AMPERE	Z	IMPEDANCE
KVAC	KILOVOLT AMPERE CAPACTIVE	Δ	DELTA
KVAR	KILOVOLT AMPERE REACTIVE	1P	ONE POLE
KW	KILOWATT	2P	TWO POLE
KWH	KILOWATT HOUR	3P	THREE POLE
LPS	LOW PRESSURE SODIUM		
MAX	MAXIMUM		
MCB	MAIN CIRCUIT BREAKER		
MCC	MOTOR CONTROL CENTER		

MEP SYMBOLS AND ABBREVIATIONS
San Antonio Housing Authority
Phase B - Fire Protection Systems & Life Safety Renovations
Villa Tranchese Apartments
 307 Marshall Street
 San Antonio, Texas



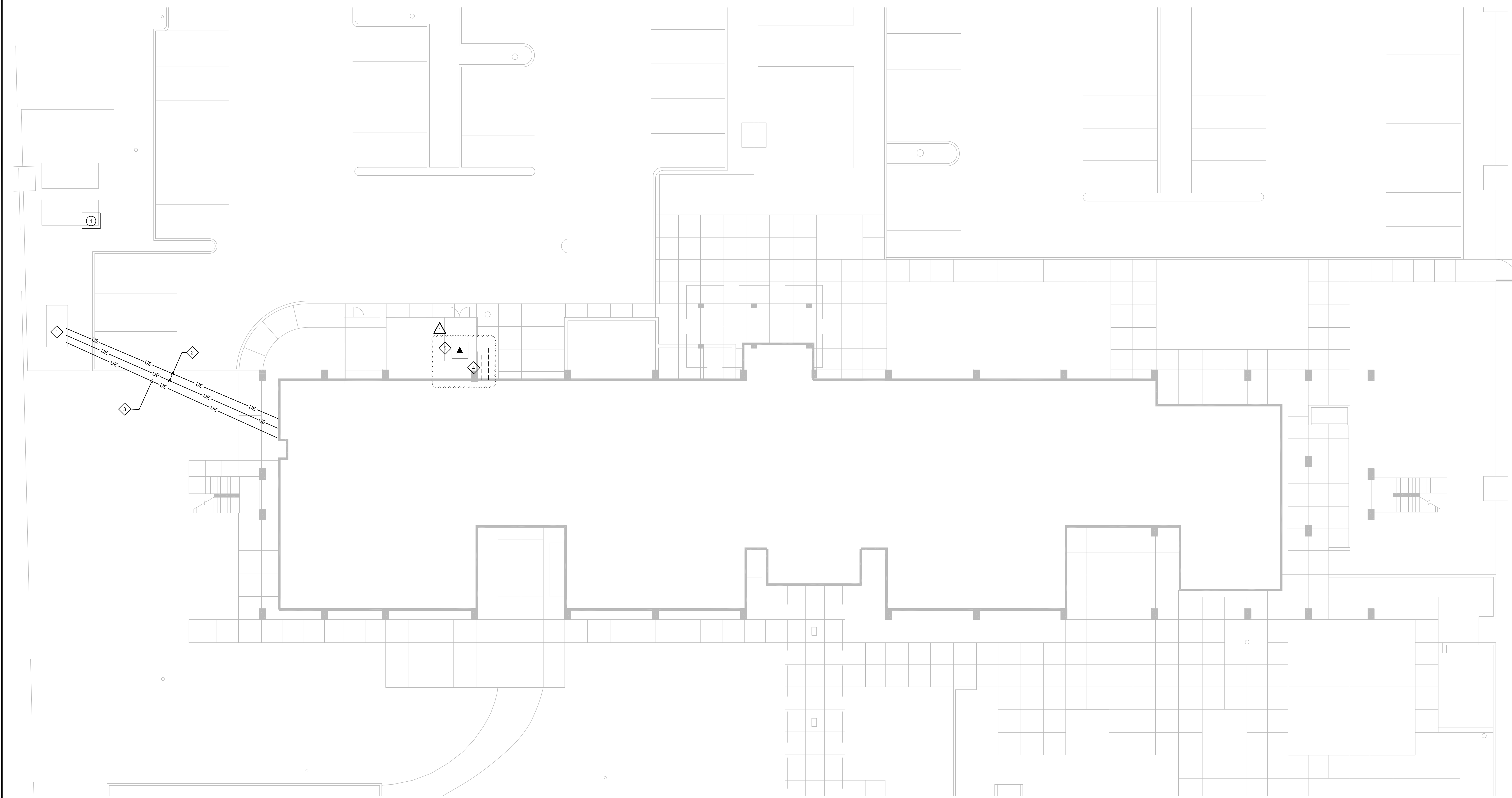
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No.	DATE	DESCRIPTION

PROJECT No.:	CZ17052
ISSUE DATE:	06/25/18
DRAWN BY:	GC
CHECKED BY:	J.G.
REVIEWED BY:	T.D.

SHEET NO.
ME-0B

MECHANICAL/ELECTRICAL SITE PLAN - DEMO

San Antonio Housing Authority
Phase B - Fire Protection Systems & Life Safety Renovations
Villa Tranchese Apartments
 307 Marshall Street
 San Antonio, Texas



1 MECHANICAL/ELECTRICAL SITE PLAN
 WED-1B SCALE: 1" = 10'-0"

MECHANICAL DEMOLITION KEYED NOTES

- ① EXISTING 5-TON CONDENSING UNIT TO REMAIN IN PLACE.

ELECTRICAL DEMOLITION KEYED NOTES

- ◇ REMOVE EXISTING 125KW/156KVA DIESEL GENERATOR. CONTRACTOR SHALL STORE REMOVED GENERATOR ON SITE FOR OWNER SERVICING. COORDINATE WITH OWNER FOR EXACT STORAGE LOCATION.
- ◇ EXISTING FEEDER SERVING ATS #1 AND ATS #2 ARE TO BE REMOVED BACK TO ELECTRICAL ROOM IN BASEMENT. NEW FEEDERS FOR ATS #1 AND ATS #2 WILL BE PROVIDED.
- ◇ REMOVE EXISTING GENERATOR 120V/1P BRANCH CIRCUITS BACK TO SERVICE PANEL "LG" AND "LD". NEW BRANCH CIRCUITS WILL BE INSTALL FOR NEW GENERATOR.
- ◇ EXISTING GUTTER TO BE REMOVED BY CPSE. MAINTAIN EXISTING CONDUCTORS TO SERVE 5000A TAP BOX IN NEW WORK PHASE.
- ◇ EXISTING CPSE UTILITY TRANSFORMER.

HAZARDOUS MATERIALS:

IF AT ANY TIME DURING DEMOLITION OR CONSTRUCTION THE CONTRACTOR ENCOUNTERS SUSPECTED HAZARDOUS MATERIALS THE CONTRACTOR SHALL NOT DISTURB THESE SUSPECT MATERIALS IN ANY WAY. IMMEDIATELY NOTIFY OWNERS REPRESENTATIVE. AN ASBESTOS SURVEY IS AVAILABLE FOR THIS PROJECT THAT IDENTIFIES AREAS AND SYSTEMS WHERE ABATEMENT WILL BE REQUIRED. THE SURVEY IS INTENDED TO COVER POTENTIAL ITEMS IN THE CONSTRUCTION AREA. HOWEVER, THE CONTRACTOR SHALL USE CAUTION SINCE ADDITIONAL HAZARDOUS MATERIALS MAY BE UNCOVERED THAT ARE NOT IDENTIFIED IN THE SURVEY.

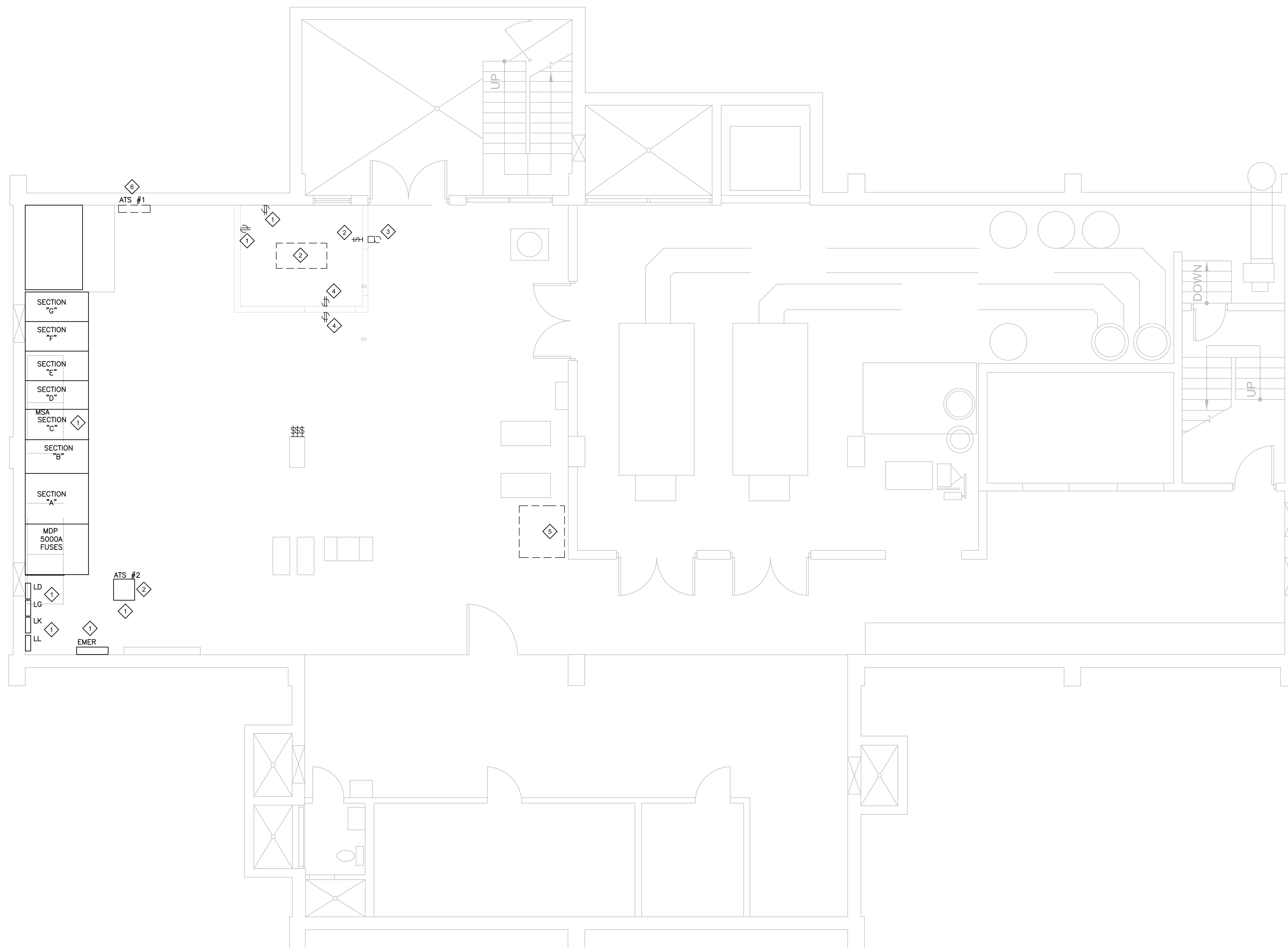


REVISIONS:

No.	DATE	DESCRIPTION
1	10/12/18	60SA REVIEW CHANGES

PROJECT No.: CZ17052
 ISSUE DATE: 06/25/18
 DRAWN BY: GC
 CHECKED BY: J.G
 REVIEWED BY: T.D

SHEET NO.
MED-1B



1 MECHANICAL/ELECTRICAL BASEMENT PLAN - DEMOLITION
 MED-2B SCALE: 1/4" = 1'-0"

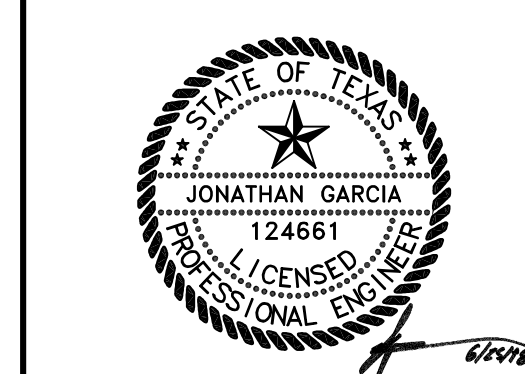
HAZARDOUS MATERIALS:

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- ELECTRICAL DEMOLITION NOTES:**
- 1 EXISTING RECEPTACLE AND/OR EQUIPMENT TO REMAIN.
 - 2 REMOVE EXISTING LIGHT FIXTURE AND CONTROL SWITCH. REMOVE BRANCH CIRCUIT BACK TO CLOSEST JUNCTION BOX OVERHEAD. WHEN NEW WORK BEGINS, POWER FOR NEW LIGHTING WILL BE FED FROM JUNCTION BOX.
 - 3 BELL SHALL BE REMOVED FROM WALL.
 - 4 EXISTING RECEPTACLE TO BE REMOVED. REMOVE BRANCH CIRCUIT BACK TO EXISTING RECEPTACLES TO REMAIN. EXISTING RECEPTACLE TO REMAIN SHALL MAINTAIN CONNECTION TO PANEL BOARD.
 - 5 EXISTING FIRE PUMP, CONTROLLER, AND JOCKEY PUMP TO BE REMOVED. REMOVE EXISTING DISCONNECTING MEANS AND BRANCH CIRCUITS BACK TO THEIR RESPECTIVE SOURCE PANELS. TURN CIRCUIT BREAKERS OFF AND LABEL PANEL SCHEDULES AS SPARE.
 - 6 EXISTING ATS #1 TO BE REMOVED, REPLACED AND RELOCATED WITH A NEW ATS #1. REFER TO SHEET ME-2 FOR MORE INFORMATION ABOUT NEW ATS #1. COORDINATE ELECTRICAL SERVICE SHUTDOWN WITH SAHA MAINTENANCE DEPARTMENT.

MECHANICAL/ELECTRICAL BASEMENT PLAN - DEMO

San Antonio Housing Authority
PHASE B - Fire Protection Systems & Life Safety Renovations
Villa Tranchese Apartments
 307 Marshall Street
 San Antonio, Texas

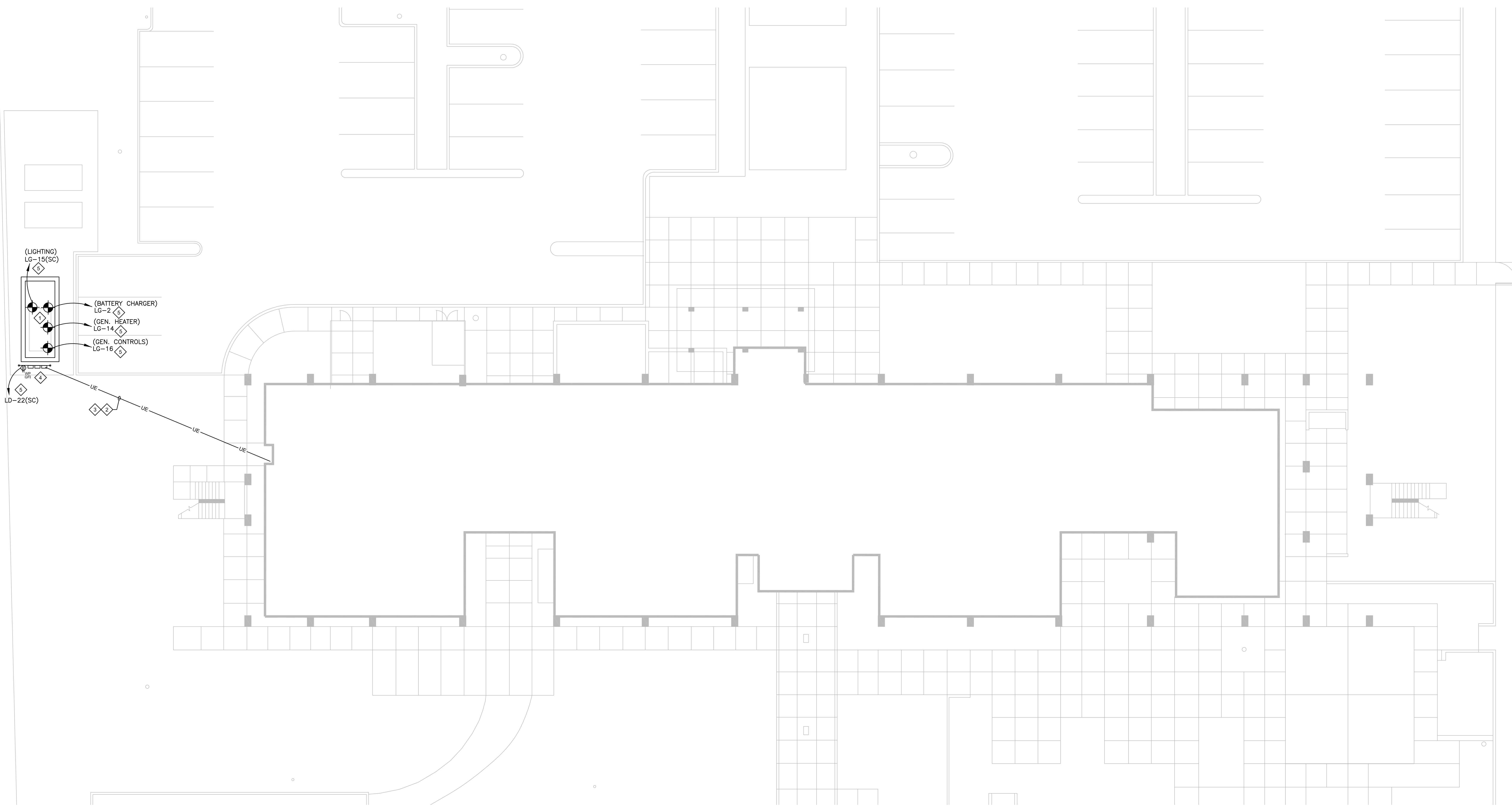


REVISIONS:

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 DRAWN BY: GC
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 REVIEWED BY: T.D.

SHEET NO.
MED-2B

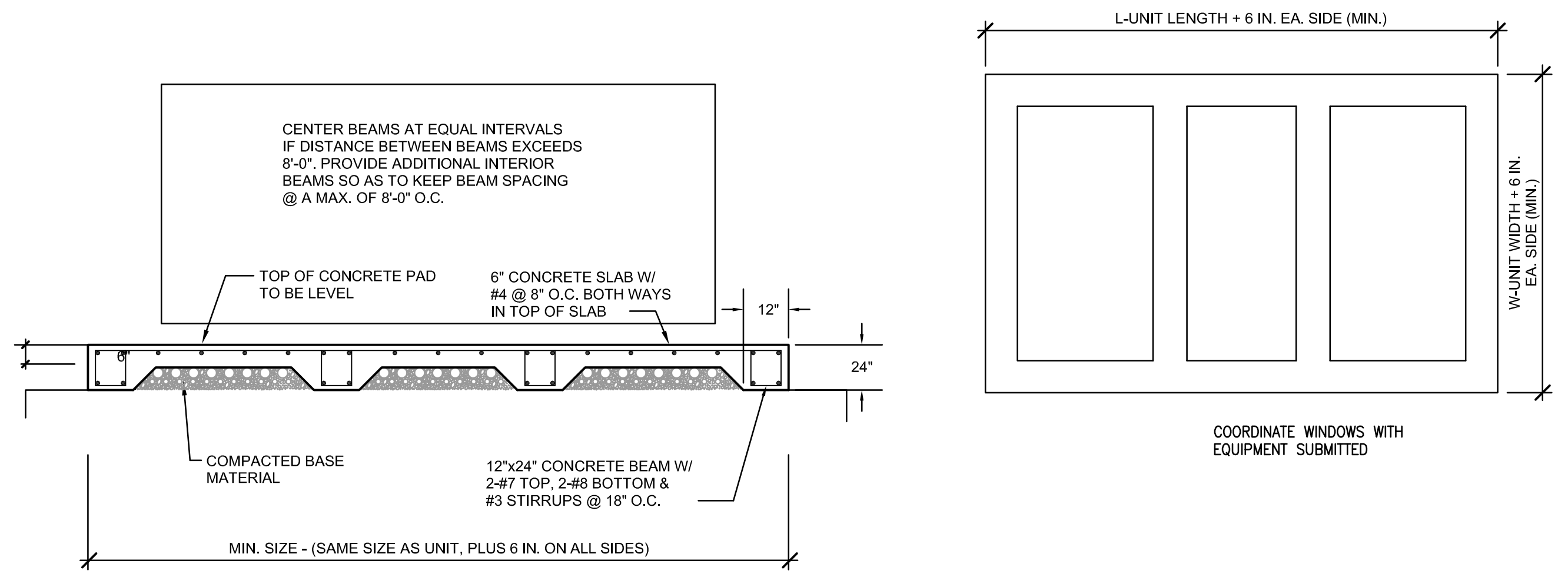


1 ELECTRICAL SITE PLAN
 SCALE: 1" = 10'-0"

- ELECTRICAL KEYED NOTES:**
- PROVIDE 350KW/437.5KVA, 208/120V, 3P, 4W, DIESEL GENERATOR. PROVIDE WITH A WEATHER PROOF ENCLOSURE. PROVIDE WITH A 24HR BASE DAY TANK. GENERATOR SHALL HAVE ONE MCB AND SERVE A RACK MOUNTED NEMA 3R ELECTRICAL BUS WAY WITH THREE (3) SEPARATE NEMA 3R ENCLOSED CIRCUIT BREAKERS. REFER TO 2/ME-1 FOR GENERATOR CONCRETE PAD DETAIL.
 - PROVIDE NEW FEEDERS FOR ATS #1, ATS #2 AND ATS #3. REFER TO SHEET ME-8 FOR MORE INFORMATION. REFER TO DETAIL 3/ME-7 FOR FIRE-STOPPING PENETRATIONS.
 - ROUTE TWO(2) SETS OF 3 #350 KCMIL, 1 #1 GND, IN 3" C. FROM 350KW GENERATOR TO ATS #3 LOCATED IN THE BASEMENT MECH/ELEC ROOM. PROVIDE TRENCH AND PATCH WORK TO ANY SIDE WALK DAMAGED. FIRE STOP ALL CONDUIT PENETRATIONS GOING INTO THE BASEMENT.
 - PROVIDE UNI-STRUT RACK FOR THREE (3) NEMA 3R ENCLOSED CIRCUIT BREAKERS AND AN ELECTRICAL GUTTER. PROVIDE WITH A GFI WEATHER PROOF RECEPTACLE. REFER TO SHEET ME-8 FOR MORE INFORMATION.
 - PROVIDE FOUR (4) 120V/1P CIRCUITS. REUSE CIRCUIT BREAKERS "LG-2" AND "LG-14" AND PROVIDE A 20A/1P CIRCUIT BREAKER IN SPOTS "LG-15" AND "LG-16". PROVIDE EACH CIRCUIT WITH 2 #10, 1 #10GND IN 1" C. REFER TO 3/ME-7 FOR MORE INFORMATION.

HAZARDOUS MATERIALS:

IF AT ANY TIME DURING DEMOLITION OR CONSTRUCTION THE CONTRACTOR ENCOUNTERS SUSPECTED HAZARDOUS MATERIALS IN ANY WAY. IMMEDIATELY NOTIFY OWNERS REPRESENTATIVE. AN ASBESTOS SURVEY IS AVAILABLE FOR THIS PROJECT THAT IDENTIFIES AREAS AND SYSTEMS WHERE ABATEMENT WILL BE REQUIRED. THE SURVEY IS INTENDED TO COVER POTENTIAL ITEMS IN THE CONSTRUCTION AREA. HOWEVER, THE CONTRACTOR SHALL USE CAUTION SINCE ADDITIONAL HAZARDOUS MATERIALS MAY BE UNCOVERED THAT ARE NOT IDENTIFIED IN THE SURVEY.



2 GENERATOR CONCRETE HOUSEKEEPING PAD
 SCALE: NOT TO SCALE



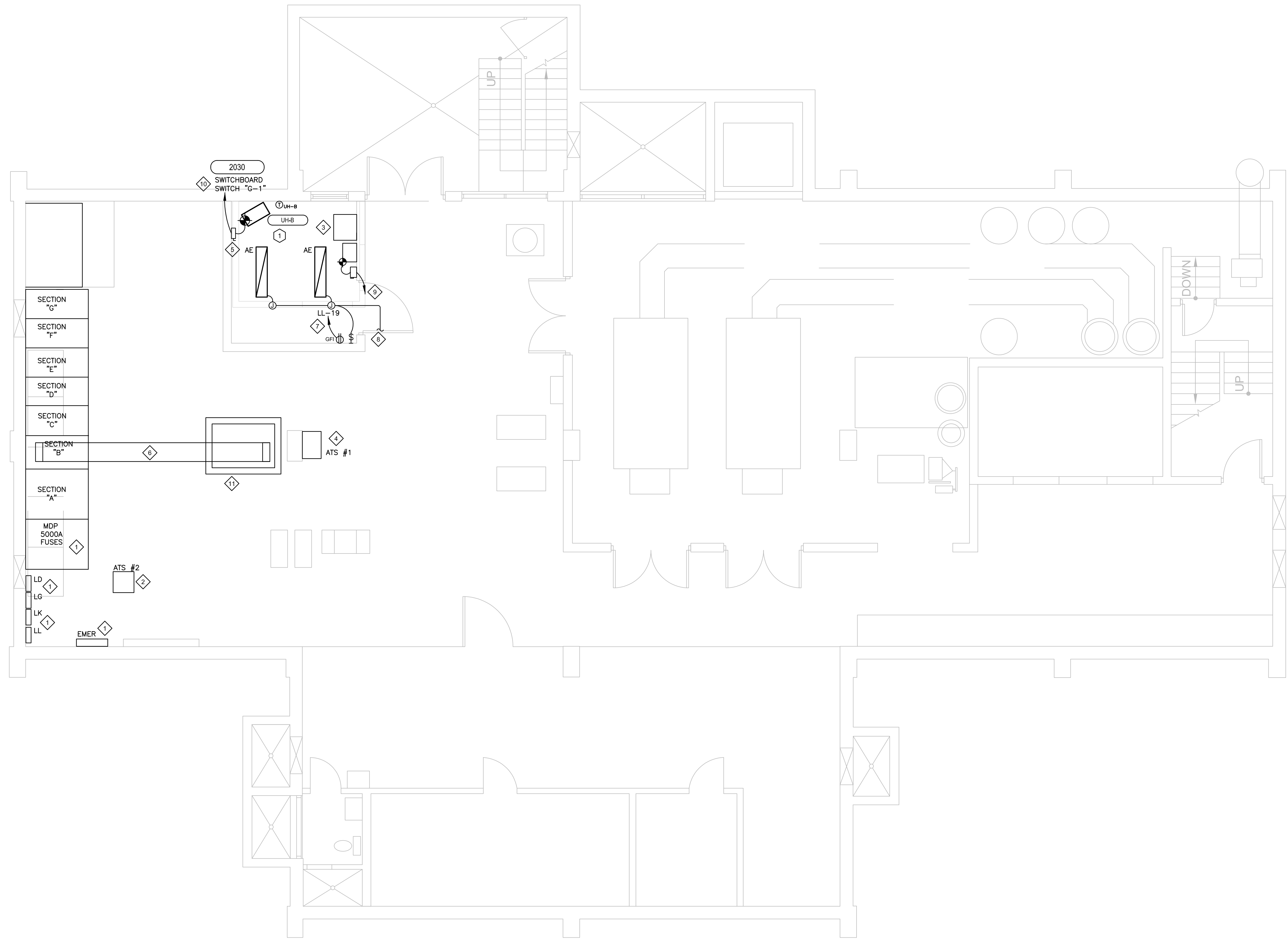
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 DRAWN BY: GC
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SHEET NO.
ME-1B

MECHANICAL/ELECTRICAL BASEMENT PLAN
 San Antonio Housing Authority
PHASE B - Fire Protection Systems & Life Safety Renovations
 Villa Tranchese Apartments
 307 Marshall Street
 San Antonio, Texas



1 MECHANICAL/ELECTRICAL BASEMENT PLAN - NEW
 ME-2B SCALE: 1/4" = 1'-0"

HAZARDOUS MATERIALS:

IF AT ANY TIME DURING DEMOLITION OR CONSTRUCTION THE CONTRACTOR ENCOUNTERS SUSPECTED HAZARDOUS MATERIALS THE CONTRACTOR SHALL NOT DISTURB THESE SUSPECT MATERIALS IN ANY WAY. IMMEDIATELY NOTIFY OWNERS REPRESENTATIVE. AN ASBESTOS SURVEY IS AVAILABLE FOR THIS PROJECT THAT IDENTIFIES AREAS AND SYSTEMS WHERE ABATEMENT WILL BE REQUIRED. THE SURVEY IS INTENDED TO COVER POTENTIAL ITEMS IN THE CONSTRUCTION AREA. HOWEVER, THE CONTRACTOR SHALL USE CAUTION SINCE ADDITIONAL HAZARDOUS MATERIALS MAY BE UNCOVERED THAT ARE NOT IDENTIFIED IN THE SURVEY.

MECHANICAL WORK KEYED NOTES

1 MOUNT NEW ELECTRIC UNIT HEATER HIGH AGAINST STRUCTURE. WALL MOUNTED THERMOSTAT TO BE PLACED AT 48" AFF.

ELECTRICAL KEYED NOTES:

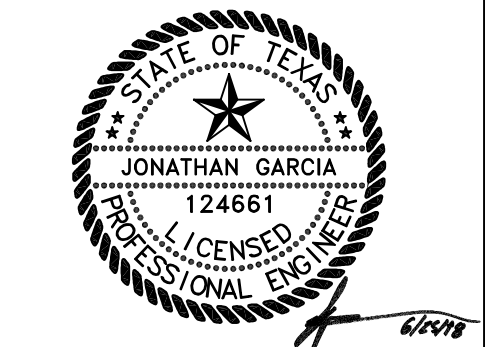
1 EXISTING ELECTRICAL EQUIPMENT TO REMAIN.
 2 EXISTING ATS #2 TO REMAIN
 3 FIRE PUMP CONTROLLER.
 4 PROVIDE A 200A, 208V, 3 PHASE, 3W, 3 POLE, WALL MOUNTED ATS. COORDINATE SERVICE OUTAGES WITH SAHA MAINTENANCE DEPARTMENT.
 5 DISCONNECT SWITCH: 30A/208V/3P/NEMA 1NF.
 6 PROVIDE 5000A RATED COPPER BUSSED DUCT FROM "MDP SECTION-B" TO NEW 5000A SWITCHBOARD SECTION TO SERVE THE FIRE PUMP. BUSSED DUCT SHALL BE ROUTED OVERHEAD TO NEW SECTION. BUSSED DUCT TO BE BOLTED ON THE EXISTING 5000A BUSSED SECTION AS SHOWN. REFER TO ONE-LINE DIAGRAM ME-9 FOR MORE INFORMATION. GEAR AND BUSSED DUCT SHALL BE INSTALLED BEFORE "MDP" IS SHUT DOWN TO MAKE THE CONNECTIONS. COORDINATE SERVICE OUTAGES WITH SAHA MAINTENANCE DEPARTMENT.
 7 PROVIDE A 20A/1P CIRCUIT BREAKER WITH 2#12, 1#12 GND IN 3/4" CONDUIT.
 8 RECONNECT LIGHTING FIXTURES TO EXISTING JUNCTION BOX. FROM JUNCTION BOX, PROVIDE 2#12, 1#12 GND IN 3/4" CONDUIT.
 9 10 HP JOCKEY PUMP PROVIDED BY OTHERS. REMOVE EXISTING 15A/3P CIRCUIT BREAKER IN SWITCHBOARD SECTION "E-8" AND PROVIDE A 60A/3P CIRCUIT BREAKER. PROVIDE WITH 3#4, 1#6 GND IN 1" CONDUIT. PROVIDE WITH A MOTOR STARTER AND DISCONNECT SWITCH. DISCONNECT SWITCH SHALL BE 60A/208V/3P/NEMA 1NF. SIZE OF MOTOR STARTER SHALL BE COORDINATED WITH JOCKEY PUMP MANUFACTURER AND FIRE PUMP ENGINEER. COORDINATE FINAL LOCATION OF JOCKEY PUMP WITH FIRE PROTECTION ENGINEER.
 10 REMOVE EXISTING 15A/3P CIRCUIT BREAKER THAT IS IN THE OFF POSITION, AND REPLACE WITH A 20A/3P CIRCUIT BREAKER IN SECTION INDICATED TO SERVE UH-B.
 11 PROVIDE 5000A 208V/120V FULLY RATED SWITCHGEAR RATED BOARD TO HOUSE A 200A CIRCUIT BREAKER TO SERVE THE 125 HP FIRE PUMP. REFER TO ONE-LINE DIAGRAM FROM MORE INFORMATION. GEAR AND BUSSED DUCT SHALL BE INSTALLED BEFORE "MDP" IS SHUT DOWN TO MAKE THE CONNECTIONS. COORDINATE SERVICE OUTAGES WITH SAHA MAINTENANCE DEPARTMENT.

LIGHTING FIXTURE SCHEDULE

MARK	MANUFACTURER / MODEL	DIMENSION	MOUNTING	FIXTURE VA	VOLTAGE	DESCRIPTION	NOTES
A	LITHONIA #ZL1F-L48-SMR-4500LM-MDD-MVOLT-40K-80CRI-CS93W-SQ	48"L X 10.7"W X 3.67"H	PENDANT AT 10FT	39	277 V	LED STRIPLIGHT	
X	LITHONIA #LQM-S-3-R-120/277-EL N-SD	11.75" X 7.625"		1	277 V	EXIT SIGN	

NOTES:

- ALL FIXTURES SHALL BE SPEC GRADE UNLESS OTHERWISE NOTED.
- ALL TOGGLE SWITCHES TO BE MOUNTED AT HEIGHTS TO COMPLY WITH ADA GUIDELINES UNLESS OTHERWISE NOTED.
- LIGHTING FIXTURES SHALL BE COORDINATED WITH THE CEILING TYPE PRIOR TO ORDERING. ALL FIXTURES SHALL BE SUPPLIED WITH APPROVED MOUNTING DEVICES, HANGERS, MOUNTING FRAMES, AND TRIM FOR PROPER INSTALLATION IN THE CEILING OR SOFFIT SYSTEM BEING PROVIDED ON THIS PROJECT REGARDLESS OF THE CATALOG NUMBER. REFER TO ARCHITECTURAL REFLECTIVE CEILING PLAN/ELEVATIONS FOR ADDITIONAL MOUNTING INFORMATION.
- ALL FIXTURES THAT HAVE A "E" SUFFIX ARE CONNECT TO GENERATOR POWER. (EXAMPLE 'C1E').

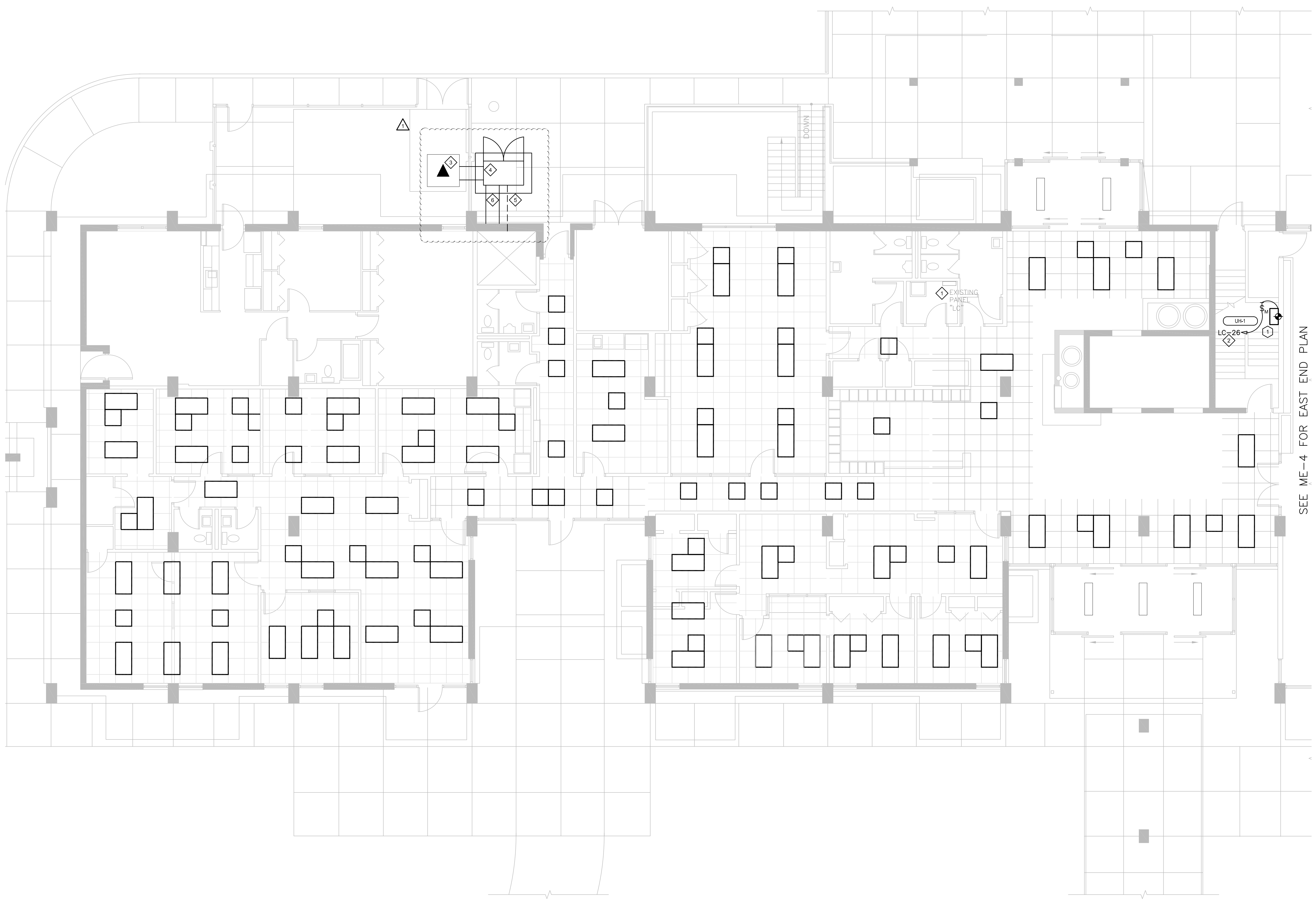


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SHEET NO.
ME-2B



1 MECHANICAL/ELECTRICAL FIRST LEVEL (WEST END) PLAN - NEW
 ME-3B SCALE: 3/16" = 1'-0"

HAZARDOUS MATERIALS:

IF AT ANY TIME DURING DEMOLITION OR CONSTRUCTION THE CONTRACTOR ENCOUNTERS SUSPECTED HAZARDOUS MATERIALS THE CONTRACTOR SHALL NOT DISTURB THESE SUSPECT MATERIALS IN ANY WAY. IMMEDIATELY NOTIFY OWNERS REPRESENTATIVE. AN ASBESTOS SURVEY IS AVAILABLE FOR THIS PROJECT THAT IDENTIFIES AREAS AND SYSTEMS WHERE ABATEMENT WILL BE REQUIRED. THE SURVEY IS INTENDED TO COVER POTENTIAL ITEMS IN THE CONSTRUCTION AREA. HOWEVER, THE CONTRACTOR SHALL USE CAUTION SINCE ADDITIONAL HAZARDOUS MATERIALS MAY BE UNCOVERED THAT ARE NOT IDENTIFIED IN THE SURVEY.

MECHANICAL NEW WORK KEYED NOTES

1 MOUNT NEW ELECTRIC UNIT HEATER AGAINST WALL AS HIGH IN THE SPACE AS POSSIBLE TO PREVENT VANDALISM. UNIT HEATER NUMBER FROM SCHEDULE CORRESPONDS TO FLOOR NUMBER.

ELECTRICAL KEYED NOTES:

1 EXISTING PANEL TO REMAIN.

2 REMOVE EXISTING 30A/2P CIRCUIT BREAKER FROM PANEL "LC-26,28" AND PROVIDE TWO (2) 201P CIRCUIT BREAKERS. SERVE UH-1 FROM CIRCUIT INDICATED ON DRAWINGS WITH 2#10, 1#10 GND IN 3/4" CONDUIT.

3 EXISTING UTILITY CPSE 300 KVA UTILITY TRANSFORMER.

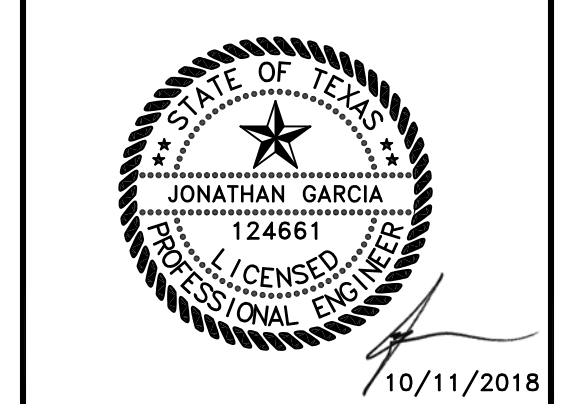
4 5000A NEMA 3R TAP BOX.

5 PROVIDE TWO (2) 2" CONDUITS WITH MINIMUM 2" CONCRETE ENCASEMENT. CONDUIT SHALL BE CONCRETE ENCASE ALL THE WAY TO THE FIRE PUMP. SAW CUT CONCRETE TO ROUT CONDUIT AND PATCH CONCRETE AFTER DUCTBACK IN INSTALLED.

6 PROVIDE GUTTER TO ROUTE EXISTING CABLES FROM TAP BOX TO SWITCHBOARD "MSB".

MECHANICAL/ELECTRICAL FIRST LEVEL (WEST END) PLAN

San Antonio Housing Authority
Phase B - Fire Protection Systems & Life Safety Renovations
Villa Tranchese Apartments
 307 Marshall Street
 San Antonio, Texas



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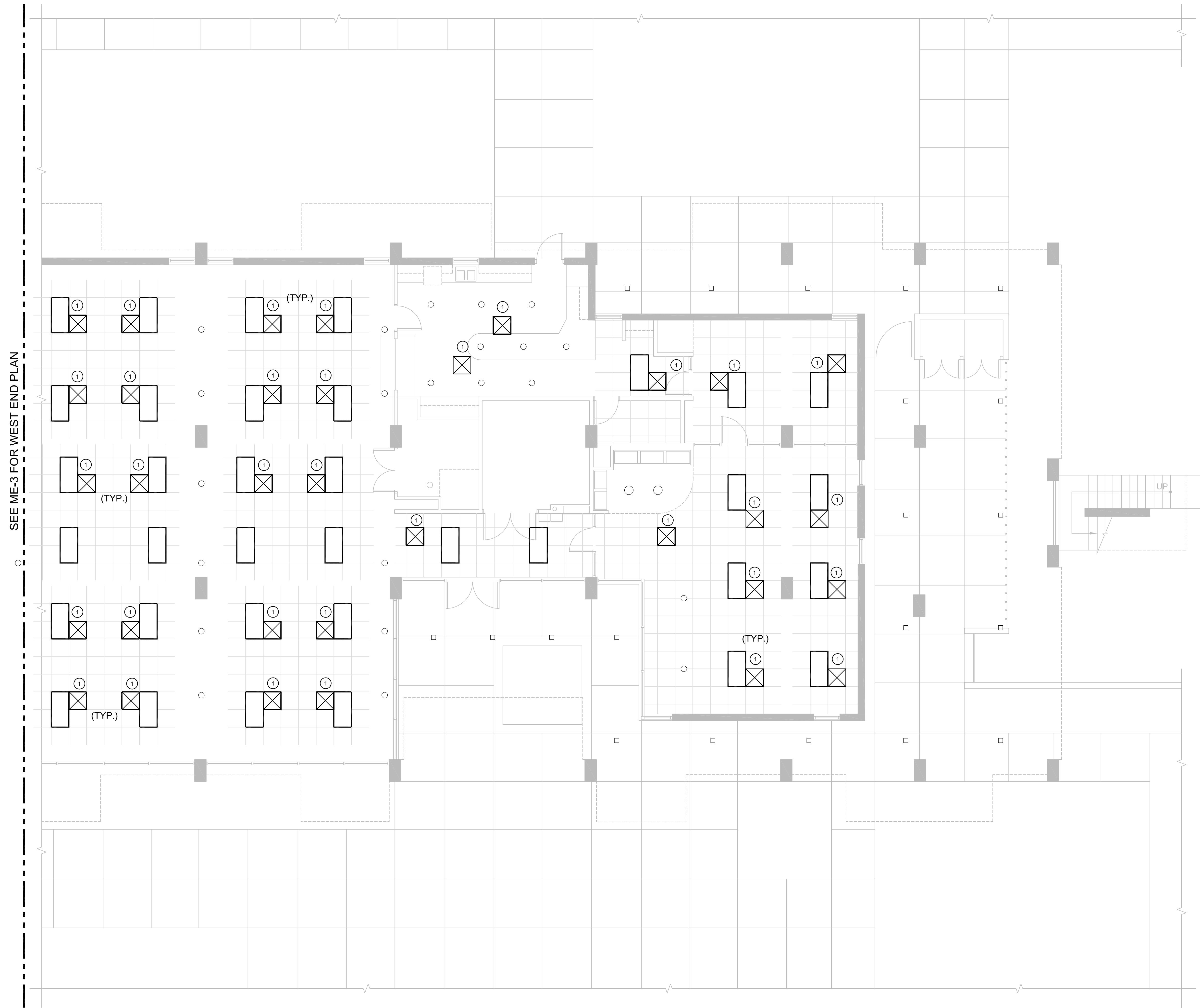
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1	10/12/18	60SA REVIEW CHANGES

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SHEET NO.
ME-3B

MECHANICAL/ELECTRICAL FIRST LEVEL (EAST END) PLAN

**San Antonio Housing Authority
 Villa Tranchese Apartments
 307 Marshall Street
 San Antonio, Texas**



1 MECHANICAL/ELECTRICAL FIRST LEVEL (EAST END) PLAN - DEMO/NEW
 ME-4 SCALE: 3/16" = 1'-0"

HAZARDOUS MATERIALS:

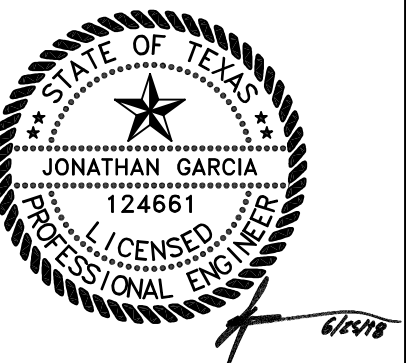
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MECHANICAL DEMOLITION KEYED NOTES

- 1 REMOVE AND REINSTALL AIR DEVICES AS REQUIRED TO ACCOMMODATE CEILING WORK ASSOCIATED WITH SPRINKLER PIPE. TYPICAL ALL AIR DEVICES.

ELECTRICAL KEYED NOTES

- 1 REMOVE AND REINSTALL LIGHTING FIXTURES, LIGHTING CONTROLS, SPEAKERS, CAMERAS, AND ANY OTHER ELECTRICAL DEVICES FROM CEILING TO ACCOMMODATE CEILING WORK ASSOCIATED WITH SPRINKLER PIPE.



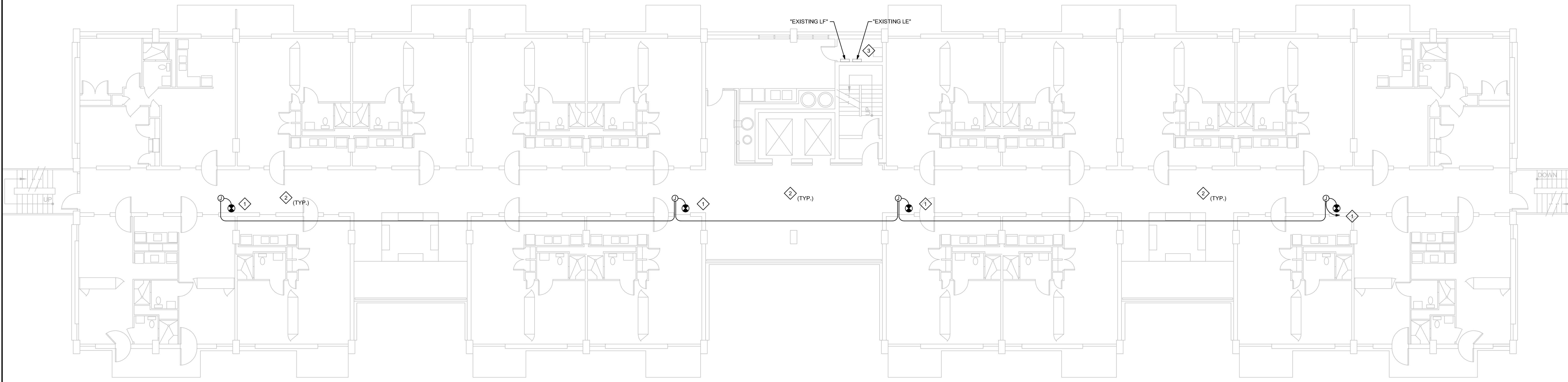
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**SHEET NO.
 ME-4B**

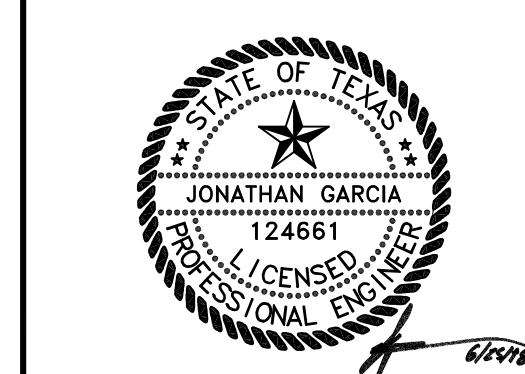


1 MECHANICAL/ELECTRICAL TYPICAL UPPER LEVELS 2-10 (EVEN) PLAN - NEW
 ME-5B SCALE: 1/8" = 1'-0"

- ELECTRICAL KEYED NOTES:**
- 1 PROVIDE 120V/AA1P POWER FOR ELECTRICAL HEAT TAPE ATTACHED TO PIPE FOR FREEZE PROTECTION. PROVIDE WITH 2#10, #10 GROUND IN 3/4" CONDUIT. COORDINATE WITH FIRE PROTECTION FOR MORE ABOUT HEAT TRACE. ON LEVELS 2, 4, 6, 8, AND 10, PROVIDE A 20A/1P CIRCUIT BREAKER IN PANEL "LE-18".
 - 2 EXISTING LIGHTING FIXTURES IN CORRIDOR ARE EXISTING TO REMAIN. NEW SPRINKLER SYSTEM SHALL BE RE-ROUTED AROUND LIGHTING FIXTURES.
 - 3 EXISTING PANELS TO REMAIN ON EVERY LEVEL.

MECHANICAL/ELECTRICAL TYPICAL UPPER LEVELS 2-10 (EVEN) PLAN

**San Antonio Housing Authority
 Villa Tranchese Apartments
 307 Marshall Street
 San Antonio, Texas**



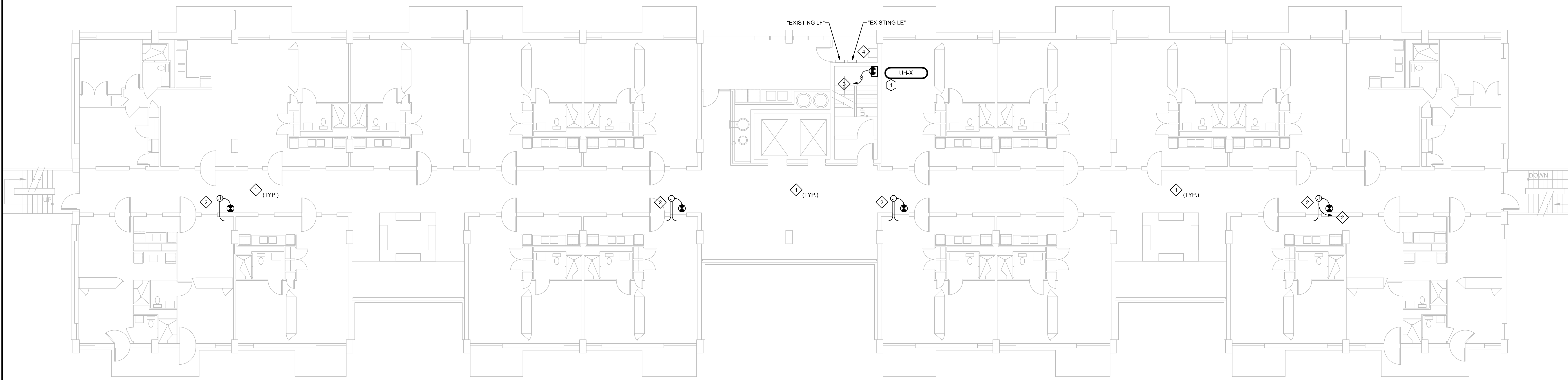
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SHEET NO.
ME-5B



1 MECHANICAL/ELECTRICAL TYPICAL UPPER LEVELS 3-11 (ODD) PLAN - NEW
 ME-6B SCALE: 1/8" = 1'-0"

MECHANICAL NEW WORK KEYED NOTES

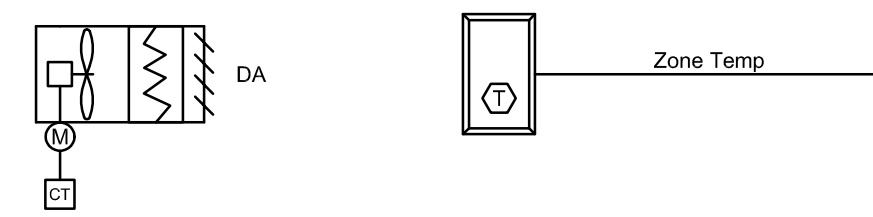
- 1 MOUNT NEW ELECTRIC UNIT HEATER AGAINST WALL AS HIGH IN THE SPACE AS POSSIBLE TO PREVENT VANDALISM. UNIT HEATER NUMBER FROM SCHEDULE CORRESPONDS TO FLOOR NUMBER.

ELECTRICAL KEYED NOTES:

- 1 PROVIDE 120V/1P POWER FOR ELECTRICAL HEAT TAPE ATTACHED TO PIPE FOR FREEZE PROTECTION. PROVIDE WITH 2#10, 1#10 GROUND IN 3/4" CONDUIT. COORDINATE WITH MECHANICAL FOR MORE ABOUT HEAT TRACE. ON LEVELS 3,5,7,9,11 PROVIDE A 20A/1P CIRCUIT BREAKER IN "LE-18"
- 2 EXISTING LIGHTING FIXTURES IN CORRIDOR ARE EXISTING TO REMAIN. NEW SPRINKLER SYSTEM SHALL BE REROUTED AROUND LIGHTING FIXTURES.
- 3 PROVIDE 120V/1P DEDICATED POWER TO A UNIT HEATER LOCATED ON EVERY OTHER FLOOR. UNIT SHALL HAVE A TOGGLE SWITCH LOCATED ADJACENT TO UNIT HEATER. PROVIDE WITH 2#10, 1#10 GROUND IN 3/4" CONDUIT. COORDINATE WITH MECHANICAL FOR MORE INFORMATION ABOUT THE UNIT HEATERS. ON LEVELS 3,5,7,9,11 A PROVIDE A 20A/1P CIRCUIT BREAKER IN EXISTING PANEL "LE-20".
- 4 EXISTING PANELS TO REMAIN ON EVERY LEVEL.

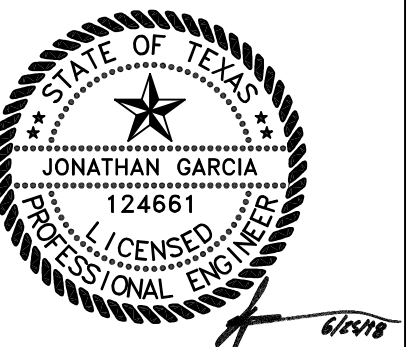
ELECTRIC UNIT HEATER SCHEDULE						
MARK	CFM	ELECT. (V/PH/KW)	OUTPUT (BTU)	ELEMENTS (NO.)	REFERENCE	NOTES
UH-B	510	480 / 3 / 4.0	13,600	1 @ 4.0 KW	REZNOR EGHB	1,2,3
UH-1	160	120 / 1 / 1.5	5,100	1 @ 1.5 KW	REZNOR EHC	1,2,3
UH-3	160	120 / 1 / 1.5	5,100	1 @ 1.5 KW	REZNOR EHC	1,2,3
UH-5	160	120 / 1 / 1.5	5,100	1 @ 1.5 KW	REZNOR EHC	1,2,3
UH-7	160	120 / 1 / 1.5	5,100	1 @ 1.5 KW	REZNOR EHC	1,2,3
UH-9	160	120 / 1 / 1.5	5,100	1 @ 1.5 KW	REZNOR EHC	1,2,3
UH-11	160	120 / 1 / 1.5	5,100	1 @ 1.5 KW	REZNOR EHC	1,2,3

- NOTES (ELECTRIC UNIT HEATER SCHEDULE):
1. PROVIDE MANUFACTURER'S STD. UNIT MOUNTED THERMOSTAT, SET AT 50 DEGREES.
 2. PROVIDE MANUFACTURER'S STD. SURFACE MOUNTING BOX. UNIT SHALL BE WHITE (HK1) IN COLOR.
 3. PROVIDE MANUFACTURER'S STD. DISCONNECT AND HIGH LIMIT TEMPERATURE CONTORL.



RUN CONDITIONS:
 THE UNIT HEATER SHALL RUN TO MAINTAIN A HEATING SETPOINT OF 50°F.

2 ELECTRIC UNIT HEATER SCHEMATIC
 ME-6B NOT TO SCALE



REVISIONS:

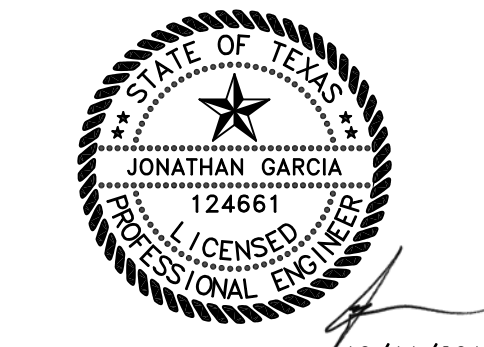
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PROJECT No.: CZ17052
 ISSUE DATE: 06/25/18
 DRAWN BY: GC
 CHECKED BY: J.G.
 REVIEWED BY: T.D.

SHEET NO.
ME-6B

ELECTRICAL ONE-LINE DIAGRAM
San Antonio Housing Authority
Villa Tranchese Apartments
PHASE B - Fire Protection Systems & Life Safety Renovations
 307 Marshall Street
 San Antonio, Texas



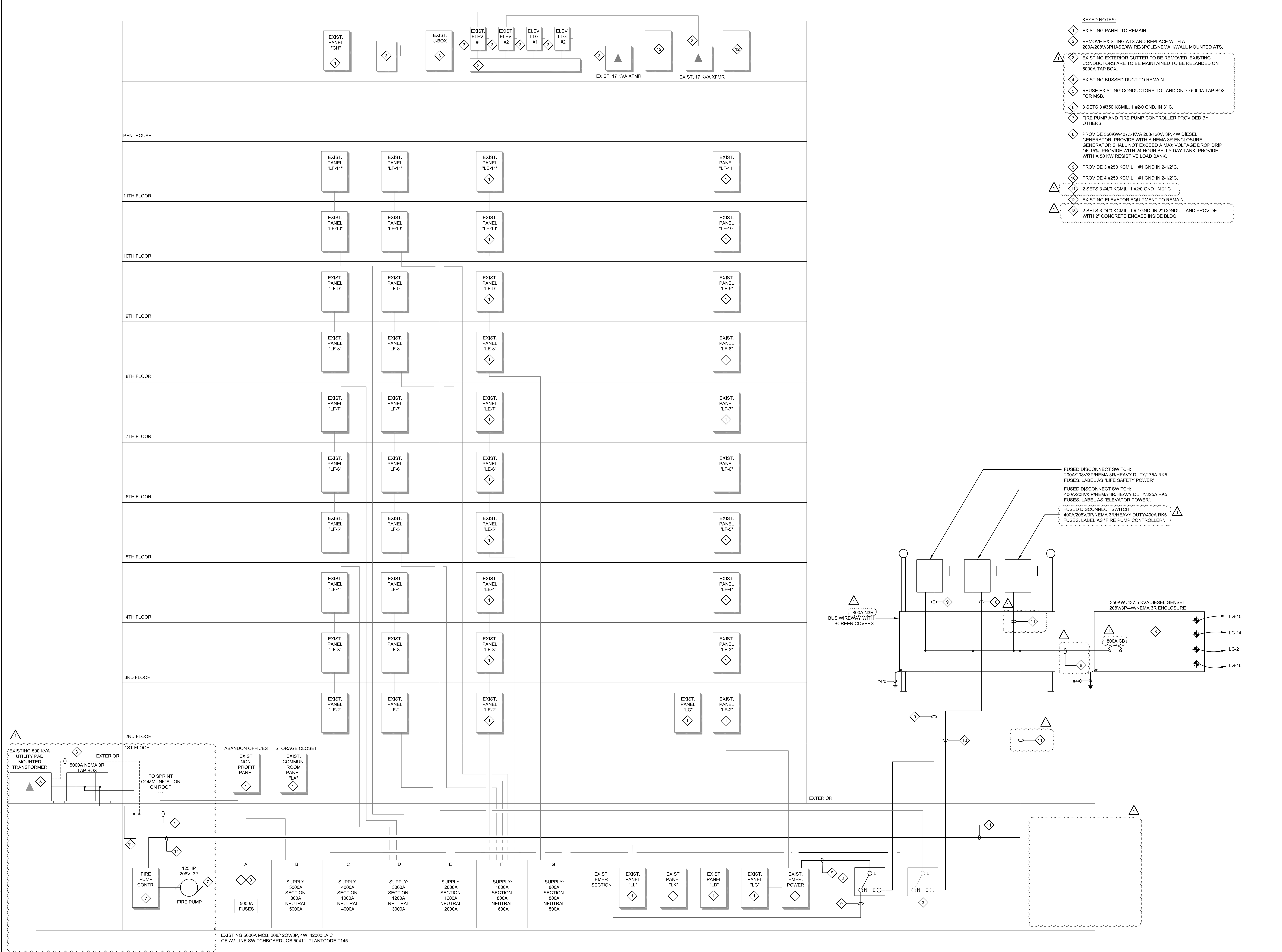
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No.	DATE	DESCRIPTION
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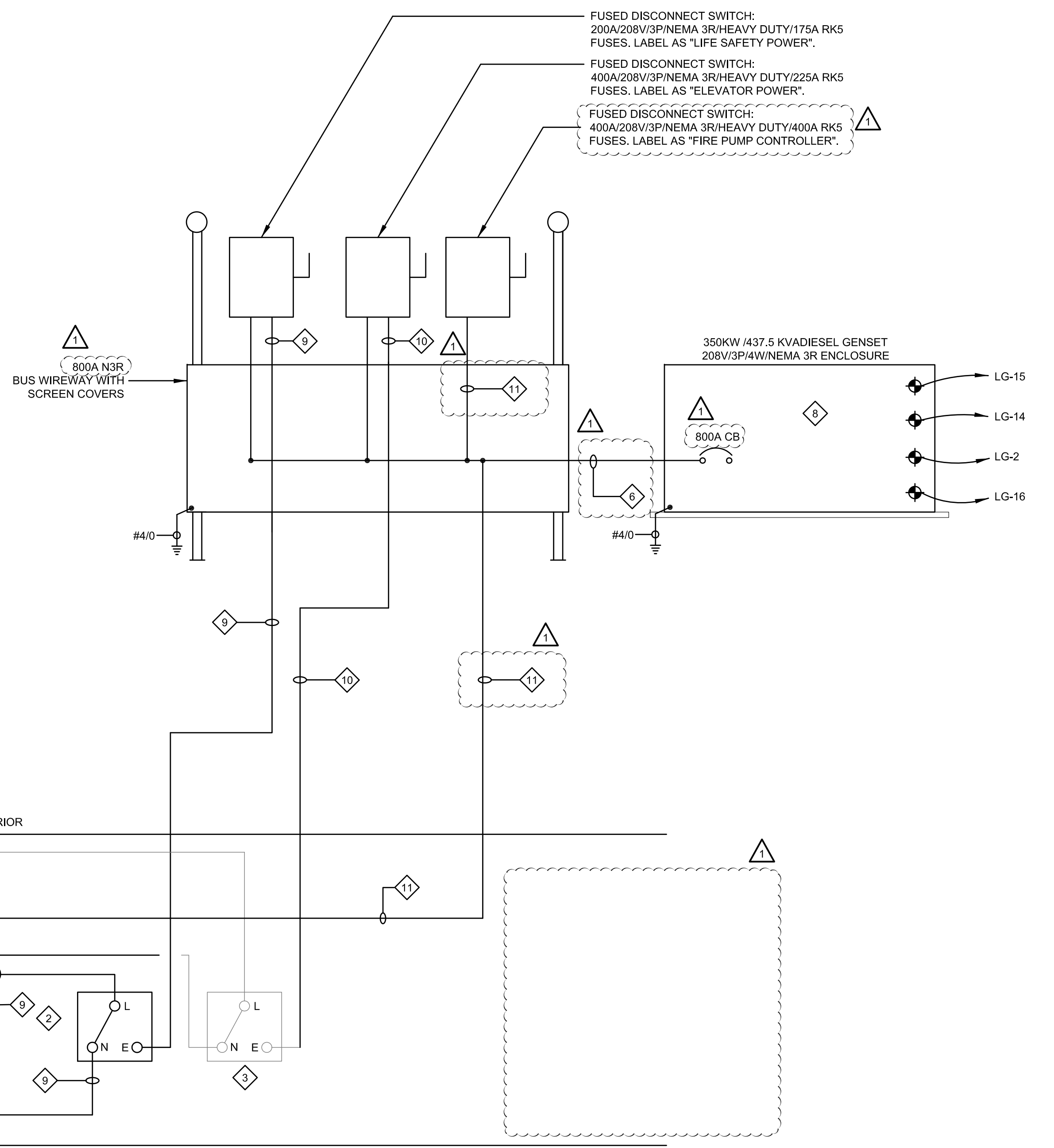
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PROJECT No.: CZ17052
 ISSUE DATE: 06/25/18
 DRAWN BY: GC
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 REVIEWED BY: T.D.

SHEET NO.
ME-7B



- KEYED NOTES:**
- 1 REMOVE EXISTING PANEL TO REMAIN.
 - 2 REMOVE EXISTING AT'S AND REPLACE WITH A 200A/208V/3PHASE/4WIRE/3POLE/NEMA 1WALL MOUNTED AT'S.
 - 3 EXISTING EXTERIOR GUTTER TO BE REMOVED. EXISTING CONDUCTORS ARE TO BE MAINTAINED TO BE RELANDED ON 5000A TAP BOX.
 - 4 EXISTING BUSSED DUCT TO REMAIN.
 - 5 REUSE EXISTING CONDUCTORS TO LAND ONTO 5000A TAP BOX FOR MSB.
 - 6 3 SETS 3 #350 KCMIL, 1 #2/0 GND. IN 3" C.
 - 7 FIRE PUMP AND FIRE PUMP CONTROLLER PROVIDED BY OTHERS.
 - 8 PROVIDE 350KW/437.5 KVA 208/120V, 3P, 4W DIESEL GENERATOR. PROVIDE WITH A NEMA 3R ENCLOSURE. GENERATOR SHALL NOT EXCEED A MAX VOLTAGE DROP DRIP OF 15%. PROVIDE WITH 24 HOUR BELLY DAY TANK. PROVIDE WITH A 50 KW RESISTIVE LOAD BANK.
 - 9 PROVIDE 3 #250 KCMIL 1 #1 GND IN 2-1/2"C.
 - 10 PROVIDE 4 #250 KCMIL 1 #1 GND IN 2-1/2"C.
 - 11 2 SETS 3 #4/0 KCMIL, 1 #2/0 GND. IN 2" C.
 - 12 EXISTING ELEVATOR EQUIPMENT TO REMAIN.
 - 13 2 SETS 3 #4/0 KCMIL, 1 #2 GND. IN 2" CONDUIT AND PROVIDE WITH 2" CONCRETE ENCASE INSIDE BLDG.



1 ELECTRICAL ONE-LINE DIAGRAM
 ME-7B NTS

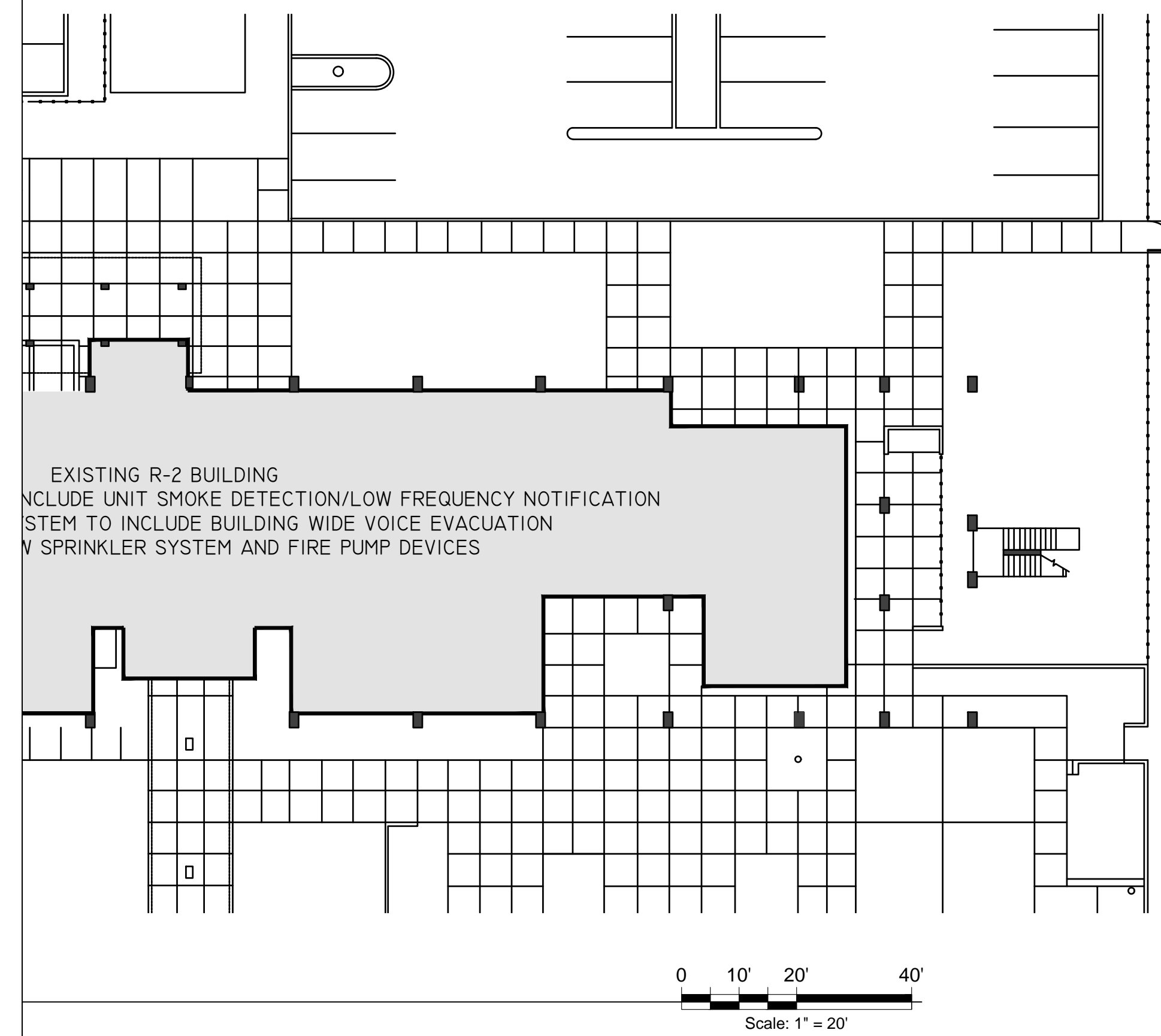
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NDMENTS

2. FIRE ALARM COMMUNICATION SYSTEM SHALL BE OF ONLY NEW EQUIPMENT AND SHALL CONNECT TO THE EXISTING BUILDING'S FIRE ALARM COMMUNICATION SYSTEM.
3. SHOULD ANY CONDITIONS EXIST THAT DIFFER FROM WHAT IS INDICATED ON THESE DRAWINGS WHICH CAUSE MAJOR DEVIATIONS IN THE WORK SHOWN, THE CONTRACTOR SHALL CONTACT FIRE PROTECTION CONSULTING GROUP, LLC IN A TIMELY MANNER SO AS NOT TO IMPAIR THE CONSTRUCTION SCHEDULE.
4. DEVICE LOCATION SHOWN ON THIS DRAWING ARE SCHEMATIC IN NATURE. NOT ALL APPURTENANCES ARE EXPECTED TO BE SHOWN ON THESE PLANS. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING FINAL DEVICES AND EQUIPMENT SIZES, DIMENSIONS, LOCATIONS, AND ELEVATIONS.
5. THE CONTRACTOR SHALL PROVIDE ALL DRAWINGS, CALCULATIONS, AND SUBMITTALS FOR REVIEW BY THE OWNER AND ARCHITECT PRIOR TO SUBMITTAL FOR PERMITTING. SUBMITTALS NOT APPROVED BY THE ARCHITECT SHALL NOT BE SUBMITTED FOR PERMITTING BY THE AHJ. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL PERMIT FEES AND SHALL PROVIDE ALL MATERIALS AND EFFORT REQUIRED FOR SUBMITTAL OF ANY AND ALL REQUIRED PERMITS.
6. ONCE APPROVED BY THE ARCHITECT, THE CONTRACTOR SHALL PROVIDE ALL DOCUMENTS AND INFORMATION REQUIRED TO OBTAIN A PERMIT FOR THE INSTALLATION OF THIS WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL PERMIT FEES AND SHALL PROVIDE ALL MATERIALS AND EFFORT REQUIRED FOR SUBMITTAL OF ANY AND ALL REQUIRED PERMITS.
7. THE CONTRACTOR SHALL MAKE EVERY EFFORT TO MAINTAIN THE INTEGRITY OF THE AESTHETICS OF THE SITE AND BUILDING ELEMENTS AFFECTED BY THE THIS WORK. SHOULD ANY DAMAGE TO SITE OR BUILDING FEATURES BE CAUSED BY THE CONTRACTOR AS PART OF THIS WORK, THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING ALL DAMAGED MATERIALS OR OTHER ITEMS TO THE SATISFACTION OF THE ARCHITECT AND OWNER.
8. THE CONTRACTOR SHALL COORDINATE TESTING AND INSPECTIONS WITH THE OWNER AND ARCHITECT AND IS RESPONSIBLE FOR ALL INSPECTION FEES.
9. THROUGHOUT CONSTRUCTION, THE CONTRACTOR SHALL MAINTAIN ON-SITE A SET OF THE MOST CURRENT WORKING DRAWINGS THAT BEAR THE APPROVAL MARK OF THE AHJ. WHERE FIELD MODIFICATIONS ARE MADE TO THE SYSTEM, THEY SHALL BE RECORDED ON THE WORKING DRAWINGS FOR INCORPORATION INTO THE PROJECT AS-BUILT DRAWINGS. THE CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS AS PART OF THE PROJECT CLOSE-OUT DOCUMENTS AND TRAINING.
10. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH THE OWNERS MONITORING COMPANY.

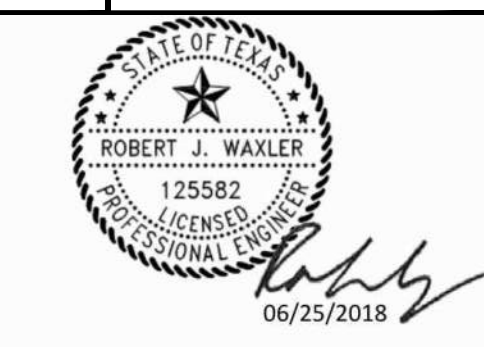
2. SHOULD ANY CONDITIONS EXIST THAT DIFFER FROM WHAT IS INDICATED ON THESE DRAWINGS WHICH CAUSE MAJOR DEVIATIONS IN THE WORK SHOWN, THE CONTRACTOR SHALL CONTACT FIRE PROTECTION CONSULTING GROUP, LLC AND RABA KISTNER CONSULTANTS, INC. IN A TIMELY MANNER SO AS NOT TO IMPAIR THE CONSTRUCTION SCHEDULE.
3. CONTRACTOR IS RESPONSIBLE FOR MAKING AND OBTAINING APPROVAL FOR ALL NECESSARY ADJUSTMENTS IN CIRCUITING AS REQUIRED TO ACCOMMODATE THE RELOCATION OF EQUIPMENT AND/OR DEVICES WHICH ARE AFFECTED BY ANY AUTHORIZED CHANGE. ALL CHANGES SHALL BE CLEARLY INDICATED ON THE RECORD DRAWINGS.
4. A STAMPED SET OF APPROVED FIRE ALARM DRAWINGS SHALL BE AT THE JOB SITE AND SHALL BE USED FOR INSTALLATION.
5. BUILDING INFORMATION:
 - 5.1. BUILDING USE: RESIDENTIAL HOUSING
 - 5.2. OCCUPANCY: R-2 HIGH RISE
 - 5.3. SQFT: 310,860
6. EXISTING FIRE ALARM INFORMATION:
 - 6.1. FIRE PUMP MONITORING
 - 6.2. SPRINKLER SYSTEM MONITORING
7. PROPOSED FIRE PROTECTION INFORMATION:
 - 7.1. DWELLING UNIT SMOKE DETECTION NOTIFICATION.
 - 7.2. DWELLING UNIT AUDIO VISUAL OCCUPANT NOTIFICATION SYSTEM
 - 7.3. BUILDING EMERGENCY EVACUATION SYSTEM
 - 7.4. BUILDING SMOKE DETECTION SYSTEM
8. ELECTRICAL CONTRACTOR SHALL PROVIDE DEDICATED POWER FOR THE NEW FIRE ALARM PANEL AT THE NEW LOCATION.
11. SEE ARCHITECTURAL PLANS FOR FIRE-RESISTANCE RATED WALL AND FLOOR/CEILING LOCATIONS. PENETRATIONS THROUGH RATED WALLS AND FLOOR/CEILINGS SHALL BE SEALED WITH A LISTED PENETRATION ASSEMBLY SYSTEM PER ARCHITECTURAL DRAWINGS.
12. PROVIDE SUPERVISION OF EACH LEVELS FLOOR CONTROL VALVE ASSEMBLIES.
13. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
14. NOTIFICATION, SUPERVISORY AND MODULES SHOWN ON THIS DOCUMENT ARE SUGGESTED LOCATIONS INTENDED TO SHOW SCOPE OF WORK. IT IS THE SELECTED SPRINKLER CONTRACTORS RESPONSIBILITY TO COORDINATE WITH MECHANICAL, STRUCTURAL AND OTHER TRADES DURING CREATION OF SHOP DRAWINGS. QUANTITY OF DEVICES SHOWN ON THIS DOCUMENT NOT INTENDED TO ENCOMPASS ALL REQUIRED TO ACCOMPLISH CODE COMPLIANT NOTIFICATION.
15. THE POWER CIRCUIT TO THE FACP AND TO THE FIRE ALARM POWER SUPPLIES SHALL BE ON A DEDICATED 120V, 20A BRANCH CIRCUIT BREAKER, AND SHALL HAVE A RED MARKING, LOCK-ON PROVISION AND SHALL BE IDENTIFIED AS "FIRE ALARM CIRCUIT CONTROL." THE LOCATION OF THE CIRCUIT DISCONNECT MEANS (CIRCUIT BREAKER) SHALL BE PERMANENTLY IDENTIFIED AT THE FIRE ALARM CONTROL UNIT.
16. THE CONTRACTOR WILL MAINTAIN ALL AREAS OF THE BUILDING IN A NEAT AND WORKMAN LIKE MANNER.
17. DO NOT APPLY POWER EXCEPT IN THE PRESENCE OF A FACTORY TRAINED TECHNICAL REPRESENTATIVE.
18. ANY SMOKE DETECTOR HEAD INSTALLED BEFORE THE BUILDING IS CLEANED AND ACCEPTED SHALL BE COVERED TO PROTECT FROM DUST. ANY FALSE ALARMS DUE TO DIRT CONTAMINATED HEADS SHALL BE THE RESPONSIBILITY OF THE FIRE ALARM INSTALLER.
19. THE FIRE ALARM INSTALLER WILL MAINTAIN THE FIRE RESISTANCE INTEGRITY OF ALL WALL, CEILING, AND ROOF ASSEMBLIES ANY TIME THAT WORK IS NOT ACTIVELY BEING PERFORMED.
20. INSTALLATION OF DEVICES SHALL BE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. POWER LIMITED AND NON-POWER LIMITED FIELD WIRING MUST BE INSTALLED WITHIN THE FACP ENCLOSURE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND NEC.
21. ALL WIRING SHALL BE INSTALLED ACCORDING TO NFPA 70 (NEC).
 - 21.1. FIRE ALARM CIRCUITS SHALL BE IDENTIFIED IN ACCORDANCE WITH APPROPRIATE SECTION OF NEC 760. MARK ALL FIRE ALARM WIRES IN ACCORDANCE WITH NEC 760 SECTIONS FOR POWER LIMITED AND NON-POWER LIMITED WIRE.
 - 21.2. FIRE ALARM CABLE INSTALLED IN DUCTS, PLENUM, AND OTHER SPACES USED FOR ENVIRONMENTAL AIR SHALL BE TYPE FPLP.
 - 21.3. FIRE ALARM CABLE INSTALLED IN THE VERTICAL RUNS AND PENETRATE MORE THAN ONE FLOOR OR CABLES INSTALLED IN VERTICAL RUNS IN SHAFTS SHALL BE TYPE FPLR.
 - 21.4. FIRE ALARM CABLE INSTALLED IN UNDERGROUND CONDUIT OR OTHER WET LOCATIONS SHALL BE UL LISTED FOR WET LOCATIONS.
 - 21.5. FIRE ALARM CIRCUITS EXTENDING BEYOND ONE BUILDING AND RUN OUTDOOR, OR UNDERGROUND, SHALL BE INSTALLED IN ACCORDANCE WITH NFPA 70 ARTICLES 760, 770, 725 AND 800 WHERE APPLICABLE.
 - 21.6. ALL WIRING, INCLUDING SHIELDS MUST BE DRY AND FREE OF SHORTS AND GROUNDS.
 - 21.7. ALL SHIELDED WIRE MUST HAVE SHIELD CONTINUITY AT FULL LENGTH OF THE WIRE.
 - 21.8. ONLY SYSTEM WIRING CAN BE RUN IN THE SAME CONDUIT.
 - 21.9. 120VAC IS NOT PERMITTED IN THE SAME CONDUIT WITH LOW VOLTAGE WIRING.
 - 21.10. MAINTAIN 40 PERCENT CONDUIT FILL RATIO AS PER NEC REQUIREMENTS.
22. EXISTING CONDUITS MAY BE USED BY THE INSTALLATION CONTRACTOR AS DEEMED NECESSARY, HOWEVER, ANY EXISTING CONDUIT WILL BE USED ONLY IF CONDUITS MEET CURRENT STANDARDS AND CODES. FIRE PROTECTION CONSULTING GROUP, LLC MAKES NO STATEMENTS WRITTEN OR VERBAL AS TO THE CONDITION OF EXISTING CONDUITS.
23. DUCT DETECTORS AND REMOTE INDICATORS TO BE PROVIDED BY FIRE ALARM CONTRACTOR AND INSTALLED BY MECHANICAL CONTRACTOR. DUCT DETECTORS MUST BE INSTALLED IN AN ACCESSIBLE LOCATION FOR SERVICING AND TESTING.
24. VISUAL OR AUDIBLE/VISUAL MOUNTING TO BE 80° TO 96° FROM THE FINISHED FLOOR TO THE BOTTOM OF THE DEVICE PER NFPA 72.
25. AUDIBLE DEVICE MOUNTING TO BE A MINIMUM OF 90° FROM THE FINISHED FLOOR TO THE TOP OF DEVICE AND NO MORE THAN 6" FROM TOP OF DEVICE TO CEILING PER N.F.P.A. 72.
26. MANUAL PULL STATION SHALL BE NOT LESS THAN 3-1/2 FT. (1.1M) AND NOT MORE THAN 4-1/2 FT (1.37M) FROM OPERABLE PART OF DEVICE TO FLOOR LEVEL PER N.F.P.A. 72.



P 210 :: 699 :: 9090
F 210 :: 699 :: 6426
TBPE Firm F-3257



Site Plan and General Notes
San Antonio Housing Authority
PHASE B - Fire Protection Systems & Life Safety Renovations
Villa Tranchese Apartments
 307 Marshall Street
 San Antonio, Texas



Fire Protection Consulting Group, LLC
Texas PE Firm# 15865

REVISIONS:		
No.	DATE	DESCRIPTION
A	5-22-2018	100% Design Review

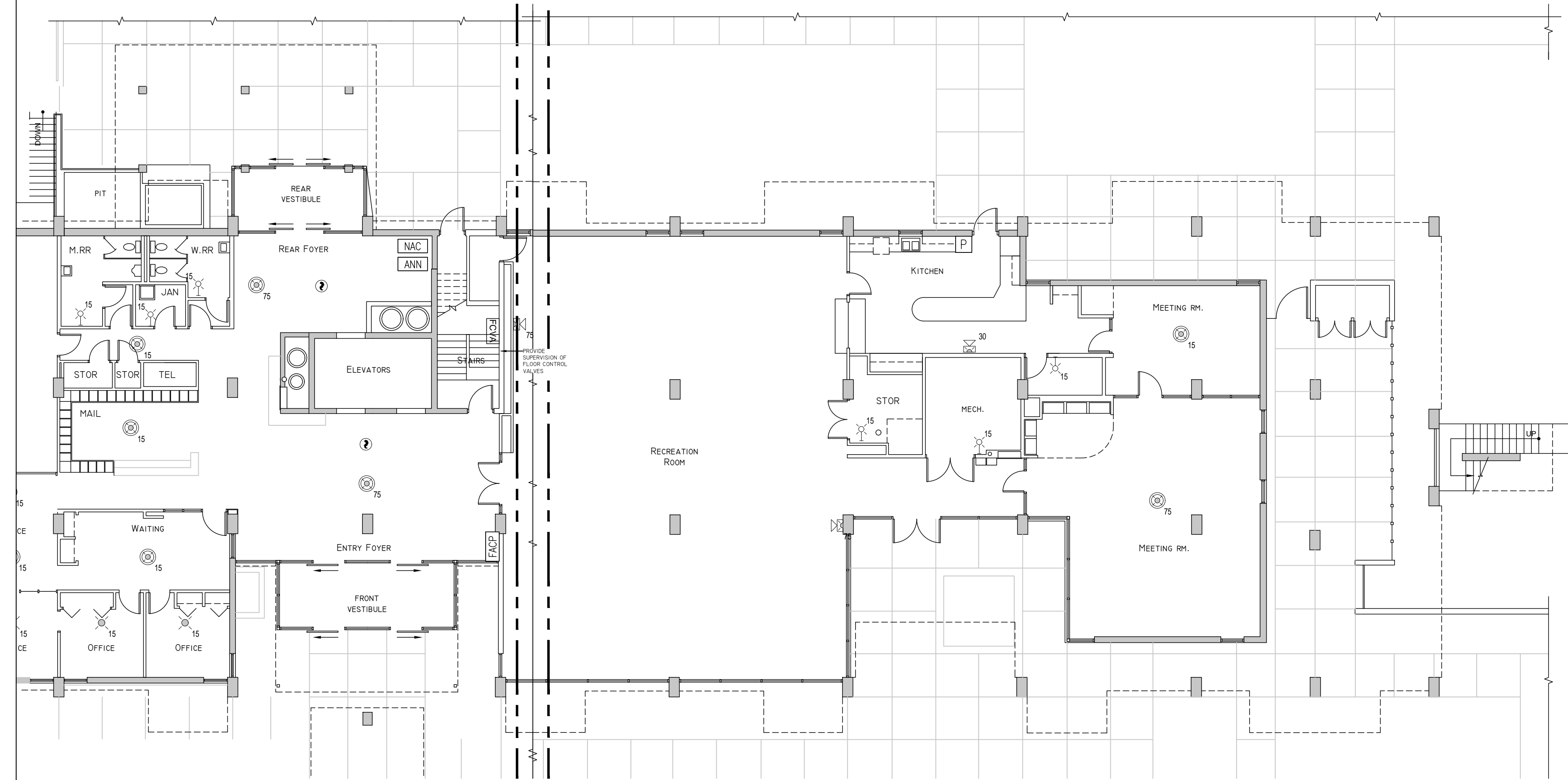
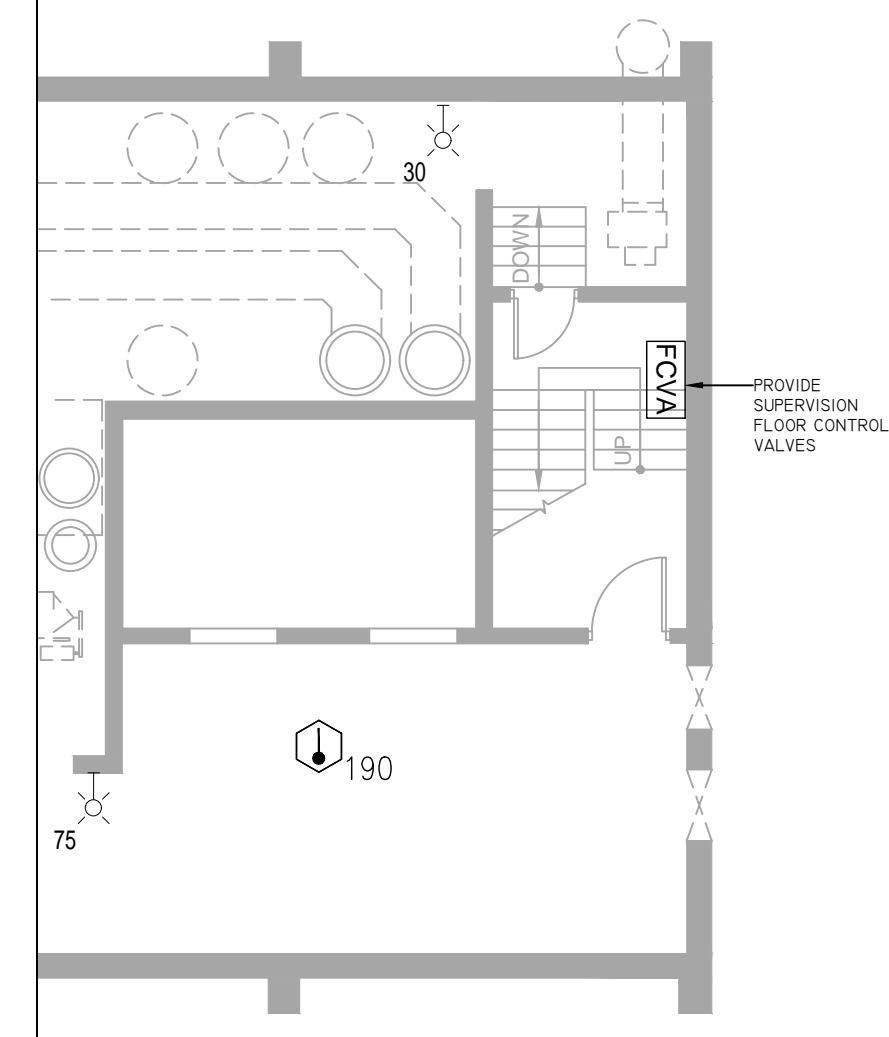
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PROJECT No.: ASR17-019-00
 ISSUE DATE: 05-22-18
 DRAWN BY: CC/KR
 CHECKED BY: RW
 REVIEWED BY: RW

SHEET NO.
FA 100

3.2. SIGNALING LINE CIRCUITS SHALL BE CLASS A.
 3.3. NOTIFICATION APPLIANCE CIRCUITS SHALL BE CLASS B.

4. INSTALL CEILING MOUNTED NOTIFICATION APPLIANCES CENTER OF TILES UNLESS NOTED OTHERWISE. INSTALL VISIBLE APPLIANCES AS SHOWN ON THESE DRAWINGS AND IN ACCORDANCE WITH NFPA 72, TABLE 18.5.4.3.1 (B) AND PARAGRAPH 18.5.4. AND IN ACCORDANCE WITH IFC, SECTION 907.10.1. STROBE CANDELA RATINGS SHALL BE AS INDICATED AND AS PRESCRIBED PER TABLES 18.5.4.3.1 (A) AND 18.5.4.3.1 (B).
5. PROVIDE SUPERVISION OF ALL TAMPER AND WATERFLOW SWITCHES IN ACCORDANCE WITH NFPA 72, PARAGRAPHS 17.12 AND 17.16.1. WHETHER SHOWN ON THESE DRAWINGS OR NOT.
6. VERIFY THAT DUCT DETECTORS INSTALLED IN PHASE A ARE COMPATIBLE WITH NEW FIRE PANEL AND REPLACE IF NECESSARY. ADDRESSABLE SYSTEM DUCT DETECTORS SHALL BE PROVIDED. DUCT SMOKE DETECTION SHALL BE INSTALLED IN ACCORDANCE WITH NFPA 72, PARAGRAPHS 17.7.5.4.2 AND 17.7.5.5. DUCT WORK IS TO BE PROPERLY IDENTIFIED AT THE LOCATION OF THE DETECTOR.
7. SPOT TYPE SMOKE DETECTION IS REQUIRED AT THE FACP AND EACH POWER SUPPLY PANEL LOCATION, ELEVATOR LOBBIES AND ELEVATOR EQUIPMENT ROOM. ADDITIONAL SPOT TYPE SMOKE DETECTORS ARE REQUIRED IN THE LOCATION OF ANY FIRE CONTROL ENCLOSURE WHICH SERVES THE FIRE ALARM SYSTEM.
8. ANY SMOKE DETECTOR HEAD INSTALLED BEFORE THE BUILDING IS CLEANED AND ACCEPTED SHALL BE COVERED TO PROTECT FROM DUST. ANY FALSE ALARMS DUE TO DIRT CONTAMINATED HEADS SHALL BE THE RESPONSIBILITY OF THE FIRE ALARM INSTALLER.
9. 190 ° HEAT DETECTOR WILL SERVE AS REQUIRED DETECTION AT ELEVATOR LOBBIES IN OPEN CORRIDORS.
10. ALL MANUAL FIRE ALARM BOXES, SMOKE DETECTORS, AND NOTIFICATION APPLIANCES SHALL BE FLUSH MOUNT ON RECESSED BACK BOXES WHERE IN PUBLIC SPACES WHERE BUILDING COMPONENTS ALLOW IT.
11. CONTROL PANELS AND POWER SUPPLY UNITS SHALL BE INSTALLED AS INDICATED OR IN NON-PUBLIC AREAS AND MAY BE SURFACE MOUNTED. DEVICES SUCH AS WALL MOUNTED VISUAL APPLIANCES, WALL MOUNTED COMBINATION AUDIBLE/VISUAL APPLIANCES, ETC. SHOULD BE FLUSH MOUNTED WHERE POSSIBLE.
12. THE POWER CIRCUIT TO THE FACP AND TO THE FIRE ALARM POWER SUPPLIES SHALL BE ON A DEDICATED 120V, 20A BRANCH CIRCUIT BREAKER, AND SHALL HAVE A RED MARKING, LOCK-ON PROVISION AND SHALL BE IDENTIFIED AS "FIRE ALARM CIRCUIT CONTROL." THE LOCATION OF THE CIRCUIT DISCONNECT MEANS (CIRCUIT BREAKER) SHALL BE PERMANENTLY IDENTIFIED AT THE FIRE ALARM CONTROL UNIT.
13. INSTALLATION OF DEVICES SHALL BE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. POWER LIMITED AND NON-POWER LIMITED FIELD WIRING MUST BE INSTALLED WITHIN THE FACP ENCLOSURE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND NEC.
14. AVERAGE AMBIENT SOUND LEVEL DESIGNATION OF 55DBA PER NFPA 72 SECTION 18.4.3, TABLE A.18.4.3. FOR BUSINESS OCCUPANCY. ALL SPEAKERS SHOWN ON PLANS A TO PRODUCE A REVERBERANT DBA OF 75 U.N.O. SPEAKERS ARE TO PROVIDE INTELLIGIBILITY PER NFPA 72.
15. SYSTEM SHALL TRANSMIT EACH OF THE FOLLOWING SIGNALS SEPARATELY.
 ALARM
 WATERFLOW
 SUPERVISORY
 TROUBLE
16. PROVIDE ALL NECESSARY MONITOR AND CONTROL MODULES FOR SMOKE DAMPERS, FIRE SMOKE DAMPERS, FIRE PUMP, SPRINKLER SYSTEM AND ELEVATOR RECALL WHETHER SHOWN ON THESE DOCUMENTS OR NOT.
17. PENETRATIONS THROUGH FIRE RATED WALLS SHALL BE SEALED WITH APPROVED FIRE RESISTIVE MATERIALS AND/OR ASSEMBLIES. MATERIAL AND ASSEMBLIES SHALL BE SUITABLE FOR THE HOURLY RATING OF THE PENETRATED CONSTRUCTION ELEMENT. THE FIRE ALARM INSTALLER WILL MAINTAIN THE FIRE RESISTANCE INTEGRITY OF ALL WALL, CEILING, AND ROOF ASSEMBLIES ANY TIME THAT WORK IS NOT ACTIVELY BEING PERFORMED.



NOTIFICATION DEVICES

- 15 CEILING STROBE ONLY
- 15 CEILING SPEAKER/STROBE VOICE/ Hi / Low FREQUENCY
- 15 WALL STROBE ONLY
- 15 WALL SPEAKER/STROBE VOICE/ Hi / Low FREQUENCY
- WALL SMOKE DETECTOR WITH LOW FREQUENCY SOUNDER BASE
- WEATHER PROOF HEAT DETECTOR

MANUAL DEVICES

- ADDRESSABLE MANUAL PULL STATION

CONTROL DEVICES

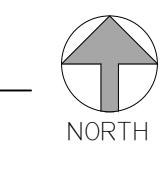
- ADDRESSABLE OUTPUT MODULE
- ADDRESSABLE INPUT MODULE

DETECTORS

- ADDRESSABLE HEAT DETECTOR 135 DEG FIXED
- ADDRESSABLE HEAT DETECTOR 190 DEG FIXED
- ADDRESSABLE SMOKE SENSOR SPOT-TYPE PHOTOELECTRIC
- ADDRESSABLE DUCT SMOKE SENSOR WITH REMOTE INDICATOR
- SMOKE DETECTOR

CONTROL PANELS

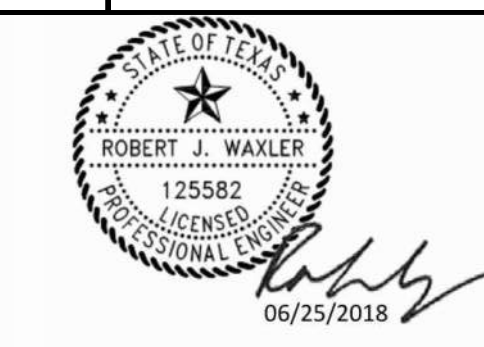
- FIRE ALARM EMERGENCY VOICE EVACUATION CONTROL PANEL
- NAC POWER SUPPLY
- TRANSIENT VOLTAGE SURGE SUPPRESSION MODULE



P 210 :: 699 :: 9090
 F 210 :: 699 :: 6426
 TBPE Firm F-3257



Basement and First Level Floor Plan
San Antonio Housing Authority
PHASE B - Fire Protection Systems & Life Safety Renovations
Villa Tranchese Apartments
 307 Marshall Street
 San Antonio, Texas



Fire Protection Consulting Group, LLC
 Texas PE Firm# 15865

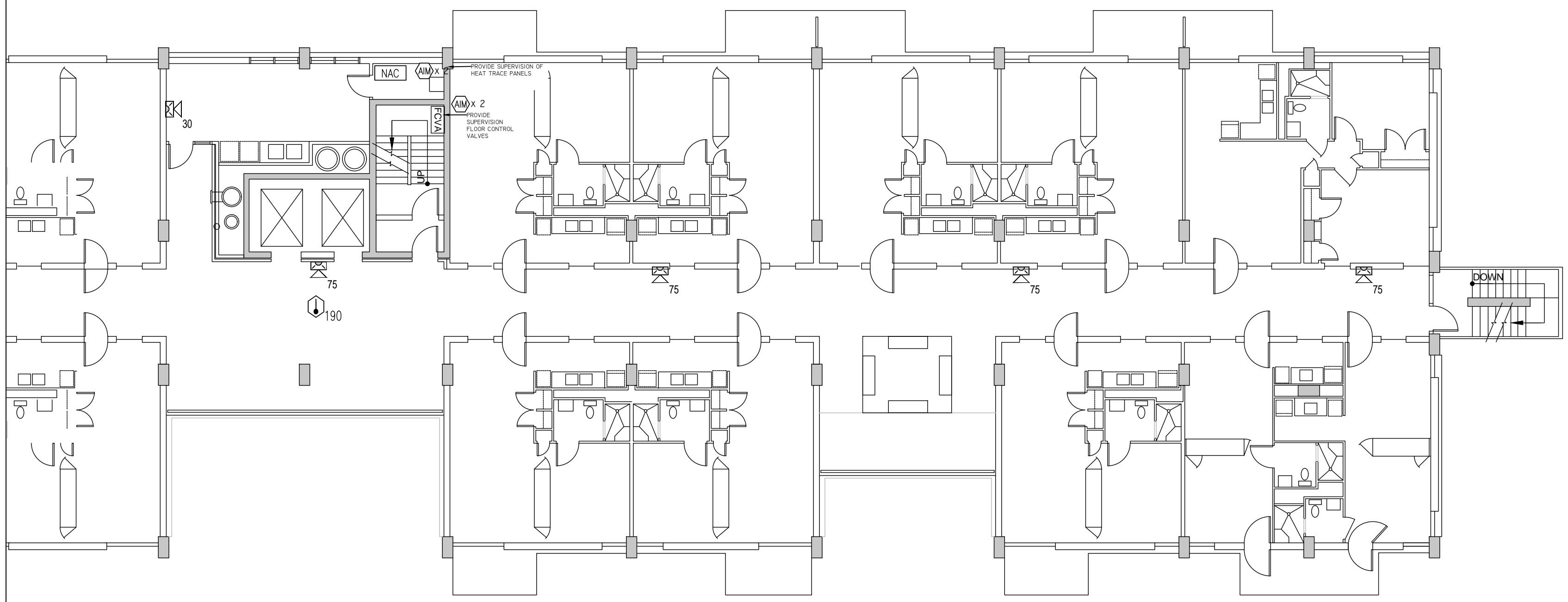
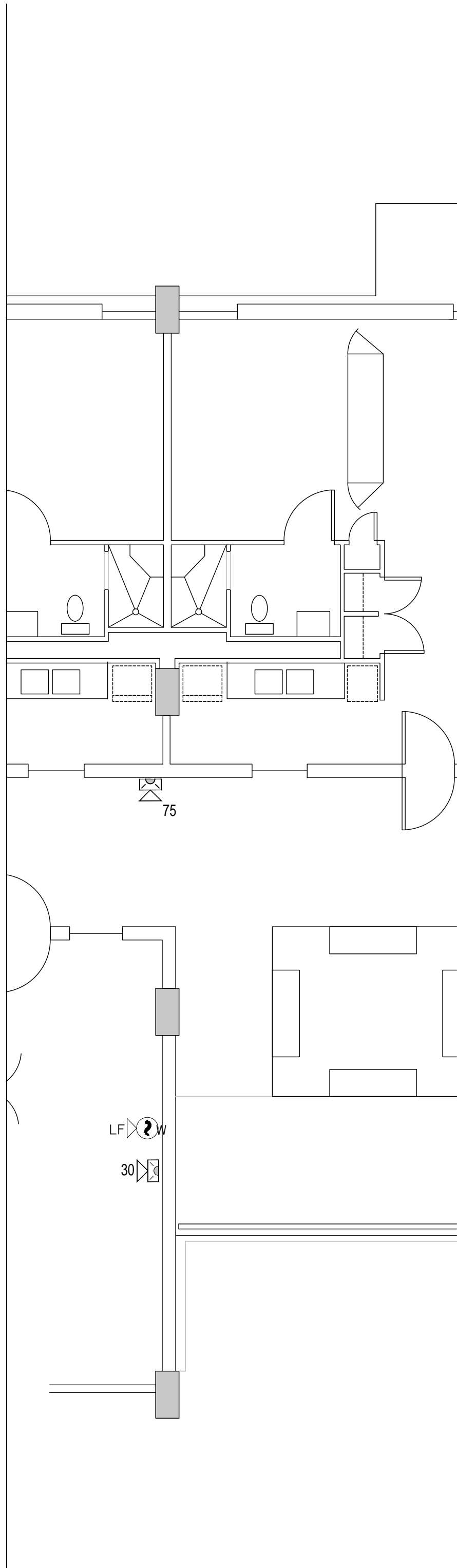
REVISIONS:

No.	DATE	DESCRIPTION
A	5-22-2018	100% Design Review

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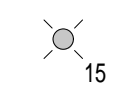
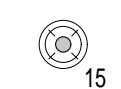
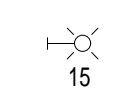
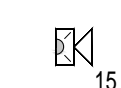


PROJECT No.: ASR17-019-00
 ISSUE DATE: 05-22-18
 DRAWN BY: CC/KR
 CHECKED BY: RW
 REVIEWED BY: RW

SHEET NO.
FA 200




- 3.2. SIGNALING LINE CIRCUITS SHALL BE CLASS A.
- 3.3. NOTIFICATION APPLIANCE CIRCUITS SHALL BE CLASS B.
4. INSTALL CEILING MOUNTED NOTIFICATION APPLIANCES CENTER OF TILES UNLESS NOTED OTHERWISE. INSTALL VISIBLE APPLIANCES AS SHOWN ON THESE DRAWINGS AND IN ACCORDANCE WITH NFPA 72, TABLE 18.5.4.3.1 (B) AND PARAGRAPH 18.5.4. AND IN ACCORDANCE WITH IFC, SECTION 907.10.1. STROBE CANDELA RATINGS SHALL BE AS INDICATED AND AS PRESCRIBED PER TABLES 18.5.4.3.1 (A) AND 18.5.4.3.1 (B).
5. PROVIDE SUPERVISION OF ALL TAMPER AND WATERFLOW SWITCHES IN ACCORDANCE WITH NFPA 72, PARAGRAPHS 17.12 AND 17.16.1. WHETHER SHOWN ON THESE DRAWINGS OR NOT.
6. VERIFY THAT DUCT DETECTORS INSTALLED IN PHASE A ARE COMPATIBLE WITH NEW FIRE PANEL AND REPLACE IF NECESSARY. ADDRESSABLE SYSTEM DUCT DETECTORS SHALL BE PROVIDED. DUCT SMOKE DETECTION SHALL BE INSTALLED IN ACCORDANCE WITH NFPA 72, PARAGRAPHS 17.7.5.4.2 AND 17.7.5.5. DUCT WORK IS TO BE PROPERLY IDENTIFIED AT THE LOCATION OF THE DETECTOR.
7. SPOT TYPE SMOKE DETECTION IS REQUIRED AT THE FACP AND EACH POWER SUPPLY PANEL LOCATION, ELEVATOR LOBBIES AND ELEVATOR EQUIPMENT ROOM. ADDITIONAL SPOT TYPE SMOKE DETECTORS ARE REQUIRED IN THE LOCATION OF ANY FIRE CONTROL ENCLOSURE WHICH SERVES THE FIRE ALARM SYSTEM.
8. ANY SMOKE DETECTOR HEAD INSTALLED BEFORE THE BUILDING IS CLEANED AND ACCEPTED SHALL BE COVERED TO PROTECT FROM DUST. ANY FALSE ALARMS DUE TO DIRT CONTAMINATED HEADS SHALL BE THE RESPONSIBILITY OF THE FIRE ALARM INSTALLER.
9. 190 ° HEAT DETECTOR WILL SERVE AS REQUIRED DETECTION AT ELEVATOR LOBBIES IN OPEN CORRIDORS.
10. ALL MANUAL FIRE ALARM BOXES, SMOKE DETECTORS, AND NOTIFICATION APPLIANCES SHALL BE FLUSH MOUNT ON RECESSED BACK BOXES WHERE IN PUBLIC SPACES WHERE BUILDING COMPONENTS ALLOW IT.
11. CONTROL PANELS AND POWER SUPPLY UNITS SHALL BE INSTALLED AS INDICATED OR IN NON-PUBLIC AREAS AND MAY BE SURFACE MOUNTED. DEVICES SUCH AS WALL MOUNTED VISUAL APPLIANCES, WALL MOUNTED COMBINATION AUDIBLE/VISUAL APPLIANCES, ETC. SHOULD BE FLUSH MOUNTED WHERE POSSIBLE.
12. THE POWER CIRCUIT TO THE FACP AND TO THE FIRE ALARM POWER SUPPLIES SHALL BE ON A DEDICATED 120V, 20A BRANCH CIRCUIT BREAKER, AND SHALL HAVE A RED MARKING, LOCK-ON PROVISION AND SHALL BE IDENTIFIED AS "FIRE ALARM CIRCUIT CONTROL." THE LOCATION OF THE CIRCUIT DISCONNECT MEANS (CIRCUIT BREAKER) SHALL BE PERMANENTLY IDENTIFIED AT THE FIRE ALARM CONTROL UNIT.
13. INSTALLATION OF DEVICES SHALL BE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. POWER LIMITED AND NON-POWER LIMITED FIELD WIRING MUST BE INSTALLED WITHIN THE FACP ENCLOSURE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND NEC.
14. AVERAGE AMBIENT SOUND LEVEL DESIGNATION OF 55DBA PER NFPA 72 SECTION 18.4.3, TABLE A.18.4.3. FOR BUSINESS OCCUPANCY. ALL SPEAKERS SHOWN ON PLANS A TO PRODUCE A REVERBERANT DBA OF 75 U.N.O. SPEAKERS ARE TO PROVIDE INTELLIGIBILITY PER NFPA 72.
15. SYSTEM SHALL TRANSMIT EACH OF THE FOLLOWING SIGNALS SEPARATELY.
ALARM
WATERFLOW
SUPERVISORY
TROUBLE
16. PROVIDE ALL NECESSARY MONITOR AND CONTROL MODULES FOR SMOKE DAMPERS, FIRE SMOKE DAMPERS, FIRE PUMP, SPRINKLER SYSTEM AND ELEVATOR RECALL WHETHER SHOWN ON THESE DOCUMENTS OR NOT.
17. PENETRATIONS THROUGH FIRE RATED WALLS SHALL BE SEALED WITH APPROVED FIRE RESISTIVE MATERIALS AND/OR ASSEMBLIES. MATERIAL AND ASSEMBLIES SHALL BE SUITABLE FOR THE HOURLY RATING OF THE PENETRATED CONSTRUCTION ELEMENT. THE FIRE ALARM INSTALLER WILL MAINTAIN THE FIRE RESISTANCE INTEGRITY OF ALL WALL, CEILING, AND ROOF ASSEMBLIES ANY TIME THAT WORK IS NOT ACTIVELY BEING PERFORMED.

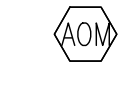

NOTIFICATION DEVICES

-  15 CEILING STROBE ONLY
-  15 CEILING SPEAKER/STROBE VOICE/ HI / LOW FREQUENCY
-  15 WALL STROBE ONLY
-  15 WALL SPEAKER/STROBE VOICE/ HI / LOW FREQUENCY
-  15 WALL SMOKE DETECTOR WITH LOW FREQUENCY SOUNDER BASE
-  WEATHER PROOF HEAT DETECTOR


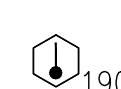


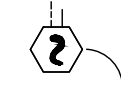
MANUAL DEVICES

-  ADDRESSABLE MANUAL PULL STATION




CONTROL DEVICES

-  ADDRESSABLE OUTPUT MODULE
-  ADDRESSABLE INPUT MODULE

DETECTORS

-  ADDRESSABLE HEAT DETECTOR 135 DEG FIXED
-  ADDRESSABLE HEAT DETECTOR 190 DEG FIXED
-  ADDRESSABLE SMOKE SENSOR SPOT-TYPE PHOTOELECTRIC
-  ADDRESSABLE DUCT SMOKE SENSOR WITH REMOTE INDICATOR
-  SMOKE DETECTOR

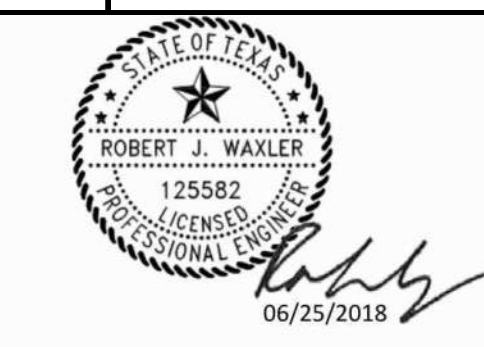
CONTROL PANELS

-  FACP FIRE ALARM EMERGENCY VOICE EVACUATION CONTROL PANEL
-  NAC# NAC POWER SUPPLY
-  TVSS TRANSIENT VOLTAGE SURGE SUPPRESSION MODULE

P 210 :: 699 :: 9090
F 210 :: 699 :: 6426
TBPE Firm F-3257



Typical Upper Level and Enlarged Unit Plan
San Antonio Housing Authority
PHASE B - Fire Protection Systems & Life Safety Renovations
Villa Tranchese Apartments
 307 Marshall Street
 San Antonio, Texas



Fire Protection Consulting Group, LLC
Texas PE Firm# 15865

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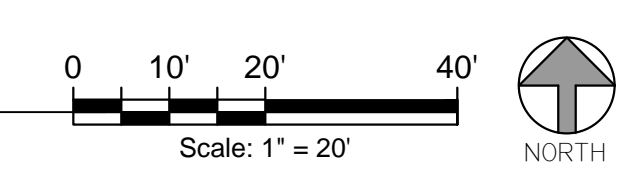
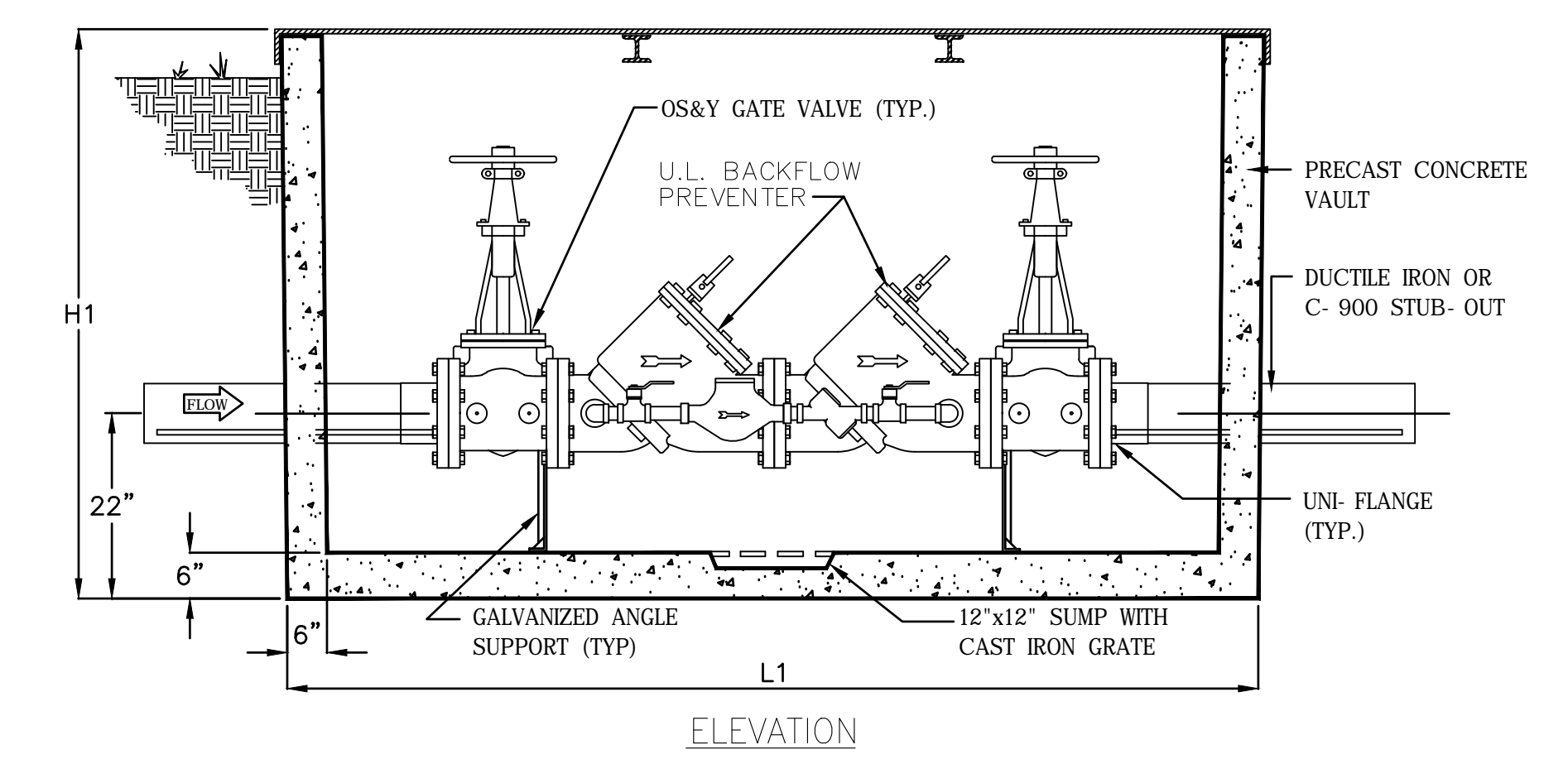
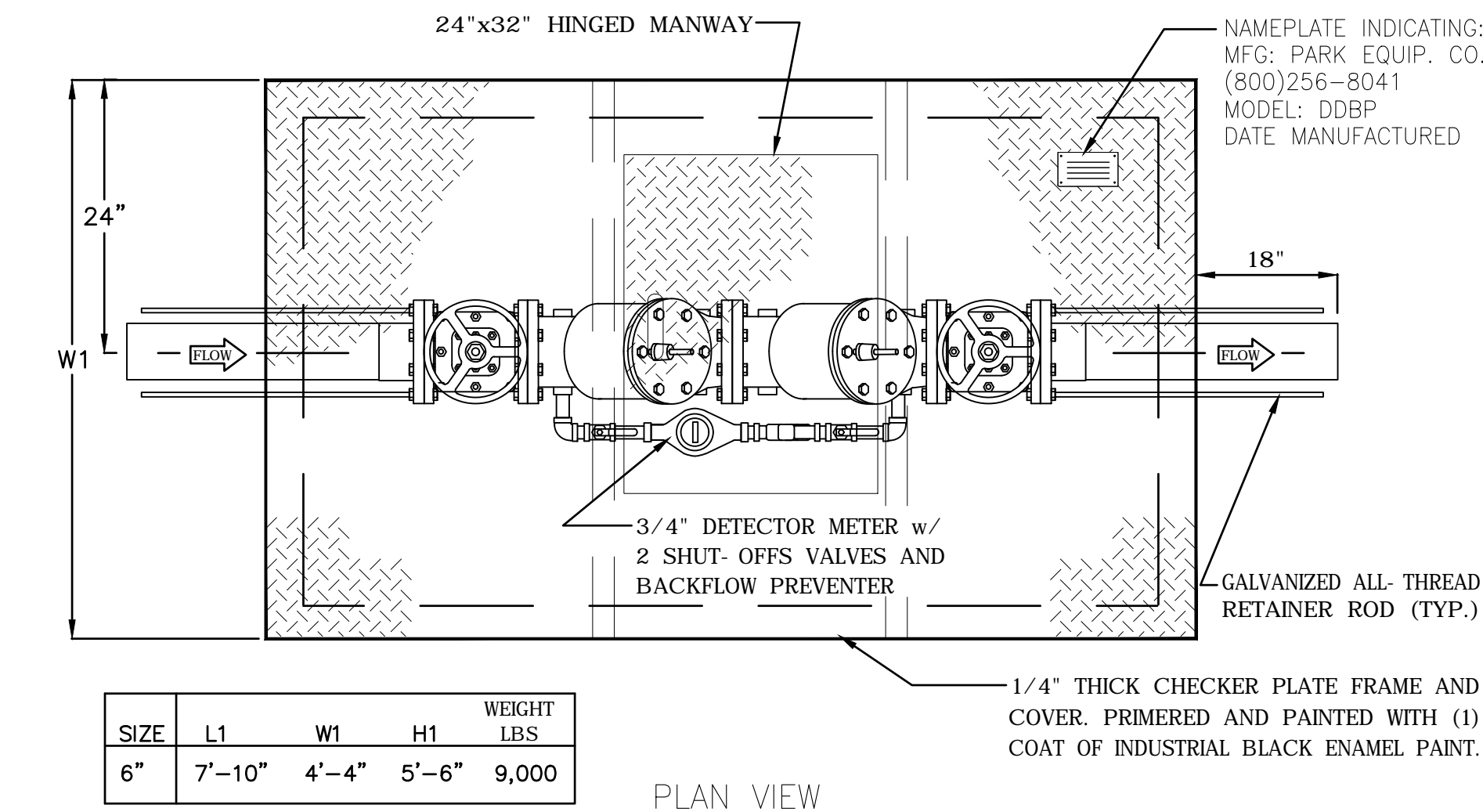
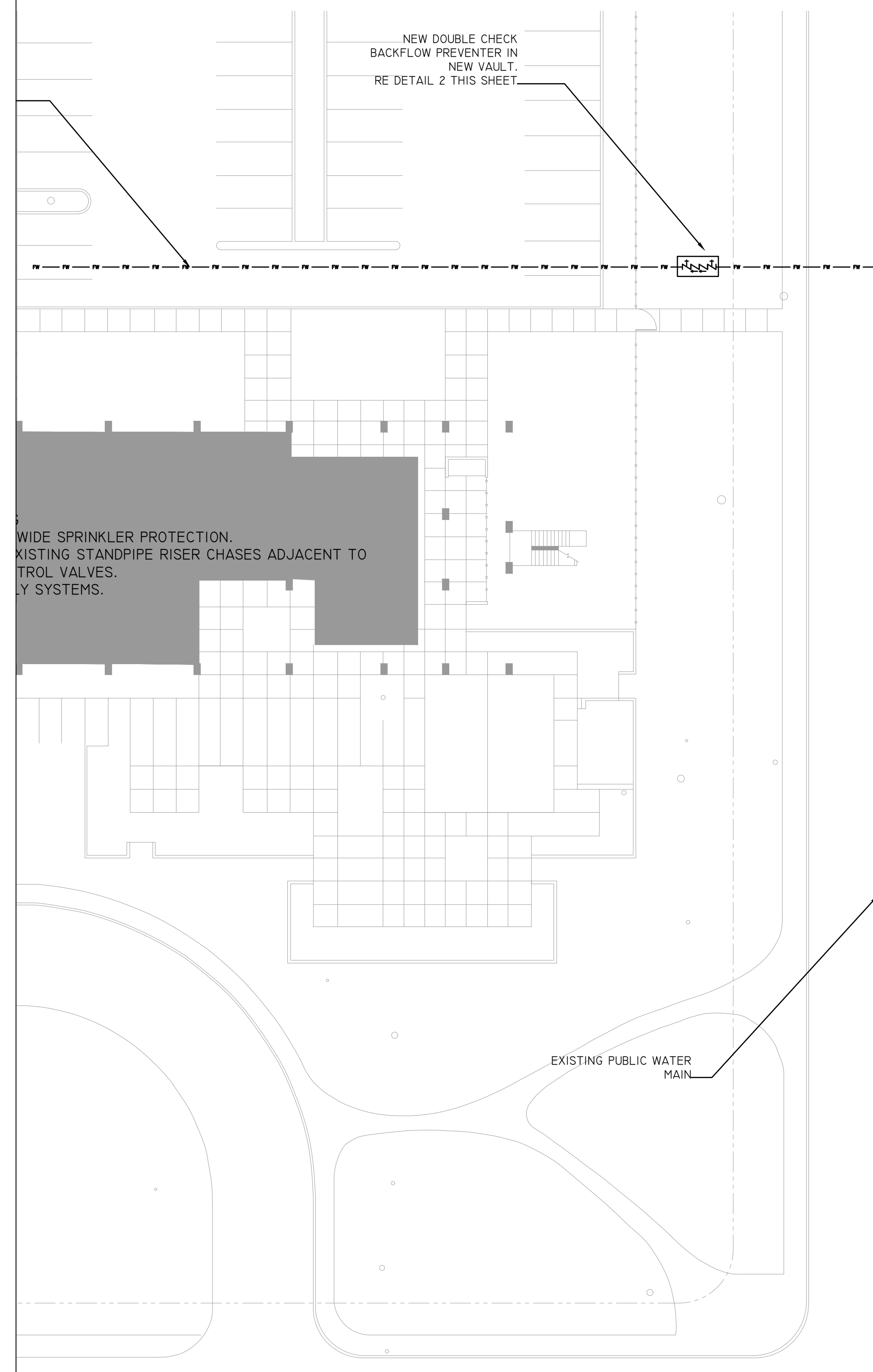
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SHEET NO.
FA 201

- CODES PER THE 2015 EDITIONS OF THE IBC AND IFC INCLUDING CITY OF SAN ANTONIO ADOPTED AMENDMENTS.
3. BUILDING INFORMATION:
 - 3.1. BUILDING USE: RESIDENTIAL HOUSING
 - 3.2. OCCUPANCY: R-2 HIGH RISE
 - 3.3. SQFT: 310,860
 4. EXISTING FIRE PROTECTION INFORMATION:
 - 4.1. CLASS II STANDPIPE SYSTEM
 - 4.2. SPRINKLERED BASEMENT
 - 4.3. STANDPIPE FIRE PUMP
 - 4.4. REMAINING OCCUPIED SPACES NOT SPRINKLERED
 5. PROPOSED FIRE PROTECTION INFORMATION:
 - 5.1. NEW WET SPRINKLER STANDPIPE WITH INDIVIDUAL FLOOR CONTROL VALVES LOCATED IN CENTRAL STAIR.
 - 5.2. NEW FIRE PUMP TO SERVE BOTH THE STANDPIPE AND BUILDING SPRINKLER SYSTEM
 - 5.3. NEW CLASS I STANDPIPE SYSTEM REPLACING THE EXISTING STANDPIPE AND THEIR EXISTING HOSE LINES AND CONNECTIONS.
 - 5.4. PROVIDE A FULLY SPRINKLERED BUILDING.
 6. THE OWNER SHALL BE RESPONSIBLE FOR MAINTAINING HEAT IN THE AREAS SHOWN ON PLANS TO INCLUDE CENTRAL STAIRWELL, OCCUPIED AND UNOCCUPIED UNITS, BASEMENT AND ENTIRE FIRST FLOOR. MAINTAIN A MINIMUM TEMPERATURE OF 40 DEGREES F AT ALL TIMES. REFER TO ME SHEETS FOR AREA HEATER LOCATIONS.
 7. WET SPRINKLER MAIN PIPE CROSSING EXTERIOR CORRIDORS SHALL BE PROTECTED BY A LISTED HEAT TRACE SYSTEM AND MONITORED BY THE FIRE ALARM SYSTEM. ALL SPRINKLER PIPE INCLUDING CONCEALMENT SOFFITS AND HANGERS SHALL MAINTAIN A CLEAR HEAD SPACE OF 7'-6" MINIMUM.
 8. THE ELECTRICAL CONTRACTOR SHALL PROVIDE DEDICATED POWER FOR THE NEW FIRE PUMP AT NEW LOCATION. REFER TO ME DRAWINGS.
 9. STORAGE IN SPRINKLERED AREAS SHALL BE MAINTAINED A MINIMUM OF 18 INCHES BELOW THE SPRINKLER DEFLECTORS AND A MAXIMUM OF 8 FEET AFF.
 10. NO HAZARDOUS MATERIALS STORAGE WILL BE PERMITTED IN THIS BUILDING.
 11. SEE ARCHITECTURAL PLANS FOR FIRE-RESISTANCE RATED WALL AND FLOOR/CEILING LOCATIONS. PENETRATIONS THROUGH RATED WALLS AND FLOOR/CEILINGS SHALL BE SEALED WITH A LISTED PENETRATION ASSEMBLY SYSTEM PER ARCHITECTURAL DRAWINGS.
 12. PROVIDE EACH LEVEL WITH FLOOR CONTROL VALVE ASSEMBLIES. CONNECTION TO FIRE ALARM CONTROL PANEL BY-OTHER.
 13. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
 14. SPRINKLER PIPE AND HEAD LOCATIONS SHOWN ON THIS DOCUMENT ARE SUGGESTED LOCATIONS INTENDED TO SHOW SCOPE OF WORK. IT IS THE SELECTED SPRINKLER CONTRACTOR'S RESPONSIBILITY TO COORDINATE WITH MECHANICAL, STRUCTURAL AND OTHER TRADES DURING CREATION OF SHOP DRAWINGS. QUANTITY OF HEADS SHOWN ON THIS DOCUMENT NOT INTENDED TO ENCOMPASS ALL HEADS REQUIRED TO ACCOMPLISH CODE COMPLIANT COVERAGE.

2. PROVIDE EACH LEVEL WITH FLOOR CONTROL VALVE ASSEMBLIES. CONNECTION TO FIRE ALARM CONTROL PANEL BY-OTHER.
3. THE CONTRACTOR SHALL PROVIDE ALL DRAWINGS, CALCULATIONS, AND SUBMITTALS FOR REVIEW BY THE OWNER AND ARCHITECT PRIOR TO SUBMITTAL FOR PERMITTING. SUBMITTALS NOT APPROVED BY THE ARCHITECT SHALL NOT BE SUBMITTED FOR PERMITTING BY THE AHJ. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL PERMIT FEES AND SHALL PROVIDE ALL MATERIALS AND EFFORT REQUIRED FOR SUBMITTAL OF ANY AND ALL REQUIRED PERMITS.
4. IF A CURRENT FIRE FLOW TEST IS NOT OTHERWISE PROVIDED BY THE ENGINEER, THE CONTRACTOR SHALL PROVIDE A FIRE FLOW TEST TO SUPPORT DESIGN OF THE SPRINKLER SYSTEM WORK. IF THE ENGINEER'S FLOW TEST HAS BEEN CONDUCTED MORE THAN ONE YEAR PRIOR TO THE DATE OF SUBMITTAL FOR SPRINKLER PERMIT, THE CONTRACTOR SHALL CONDUCT A NEW TEST TO BE INCLUDED WITH THE SUBMITTAL TO THE ARCHITECT AND TO THE AHJ FOR PERMITTING.
5. THE CONTRACTOR SHALL MAKE EVERY EFFORT TO MAINTAIN THE INTEGRITY OF THE AESTHETICS OF THE SITE AND BUILDING ELEMENTS AFFECTED BY THIS WORK. SHOULD ANY DAMAGE TO SITE OR BUILDING FEATURES BE CAUSED BY THE CONTRACTOR AS PART OF THIS WORK, THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING ALL DAMAGED MATERIALS, LANDSCAPING, OR OTHER ITEMS TO THE SATISFACTION OF THE ARCHITECT AND OWNER.
6. THE CONTRACTOR SHALL COORDINATE TESTING AND INSPECTIONS WITH THE OWNER AND ARCHITECT AND IS RESPONSIBLE FOR ALL INSPECTION FEES.
7. THROUGHOUT CONSTRUCTION, THE CONTRACTOR SHALL MAINTAIN ON-SITE A SET OF THE MOST CURRENT WORKING DRAWINGS THAT BEAR THE APPROVAL MARK OF THE AHJ. WHERE FIELD MODIFICATIONS ARE MADE TO THE SYSTEM, THEY SHALL BE RECORDED ON THE WORKING DRAWINGS FOR INCORPORATION INTO THE PROJECT AS-BUILT DRAWINGS. THE CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS AS PART OF THE PROJECT CLOSE-OUT DOCUMENTS AND TRAINING.

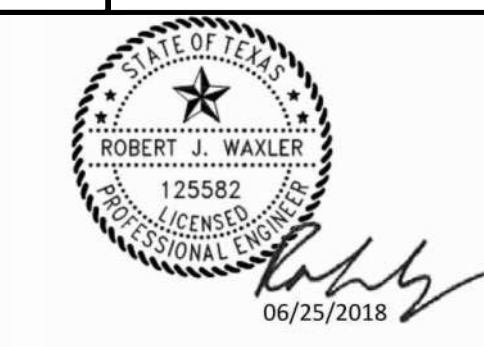


2 PROPOSED NEW BACKFLOW PREVENTER
SCALE: 3/16" = 1'-0"

P 210 :: 699 :: 9090
F 210 :: 699 :: 6426
TBPE Firm F-3257



Site Plan and General Notes
San Antonio Housing Authority
PHASE B - Fire Protection Systems & Life Safety Renovations
Villa Tranchese Apartments
 307 Marshall Street
 San Antonio, Texas



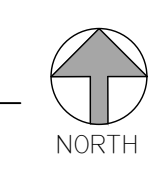
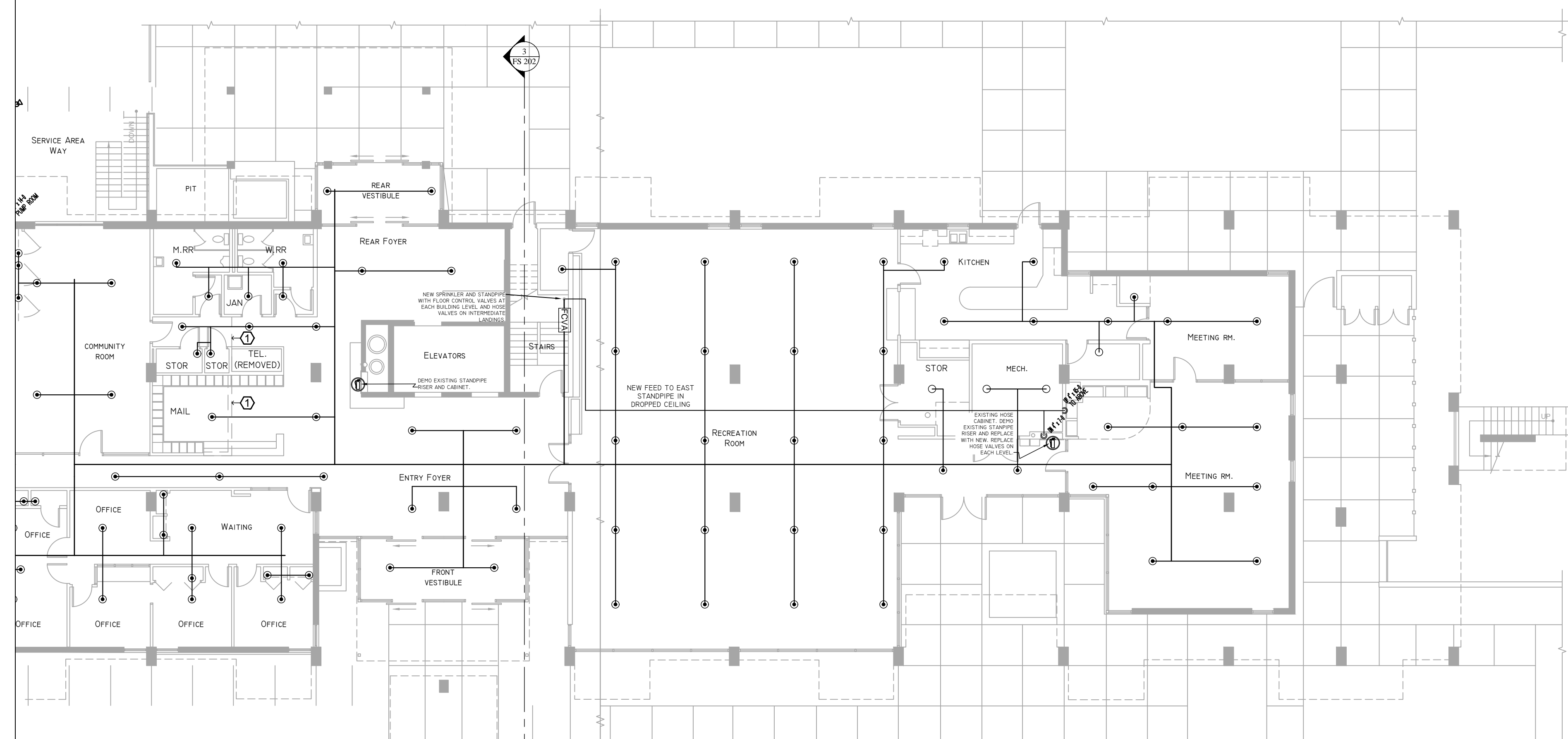
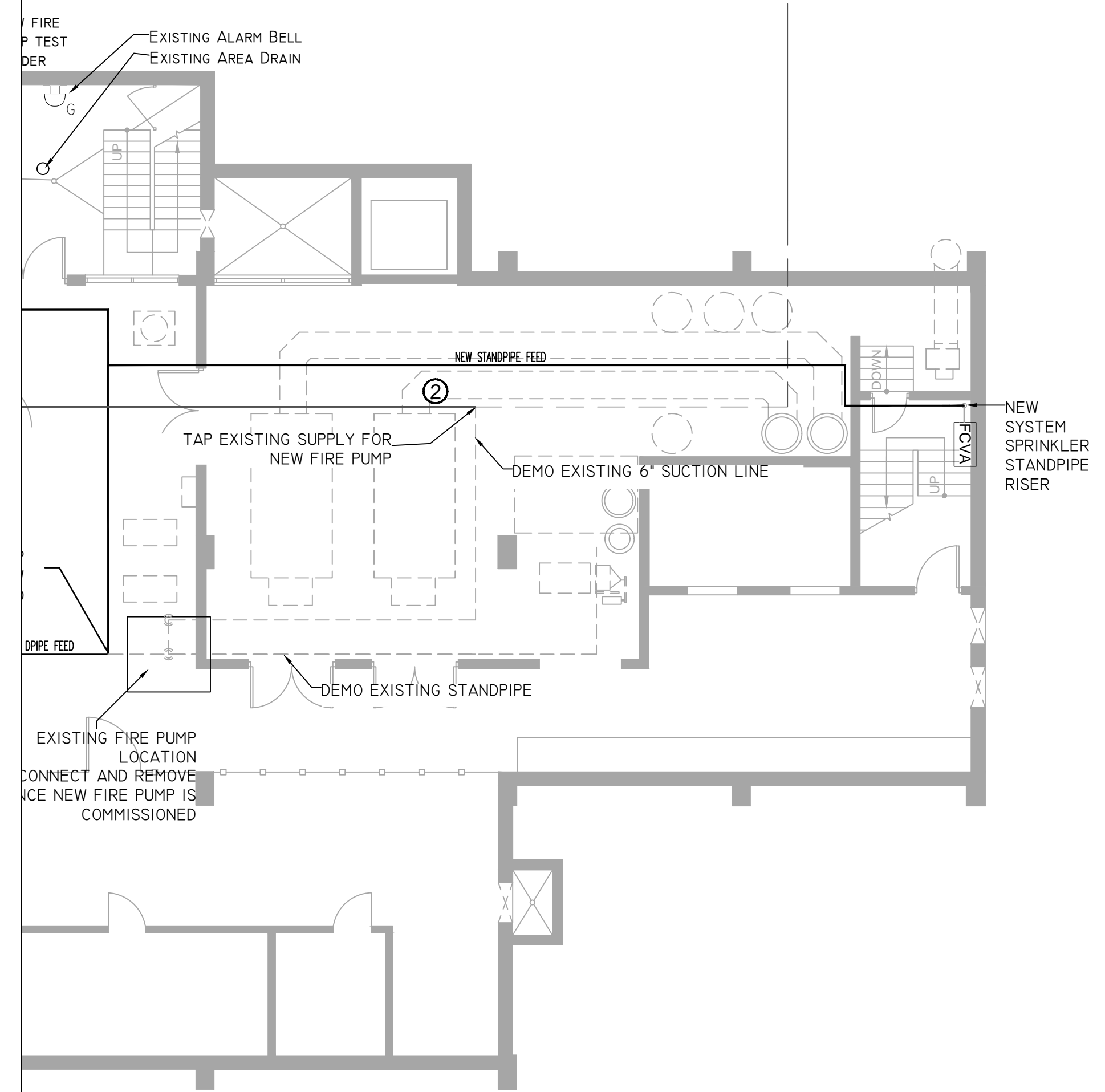
Fire Protection Consulting Group, LLC
Texas PE Firm# 15865

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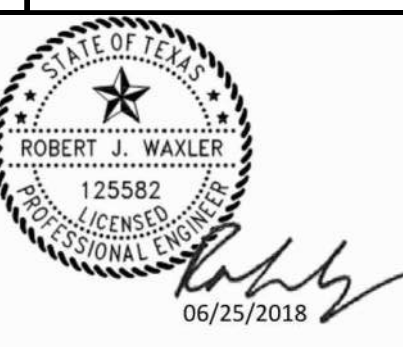
SHEET NO.
FS 100



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 F 210 :: 699 :: 6426
 TBPE Firm F-3257



Basement and First Level Plans
San Antonio Housing Authority
PHASE B - Fire Protection Systems & Life Safety Renovations
Villa Tranchese Apartments
 307 Marshall Street
 San Antonio, Texas



Fire Protection Consulting Group, LLC
 Texas PE Firm # 15865

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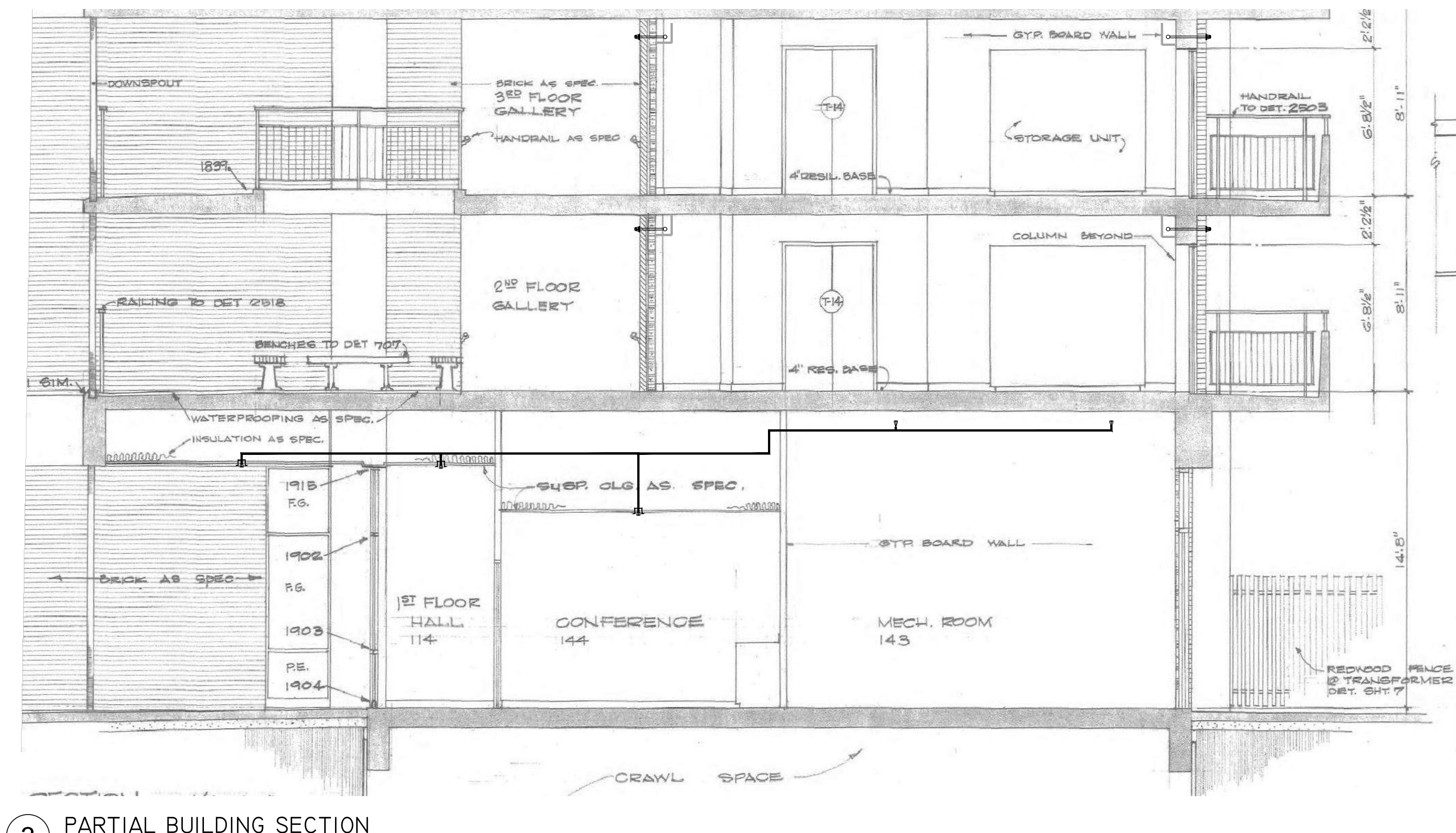
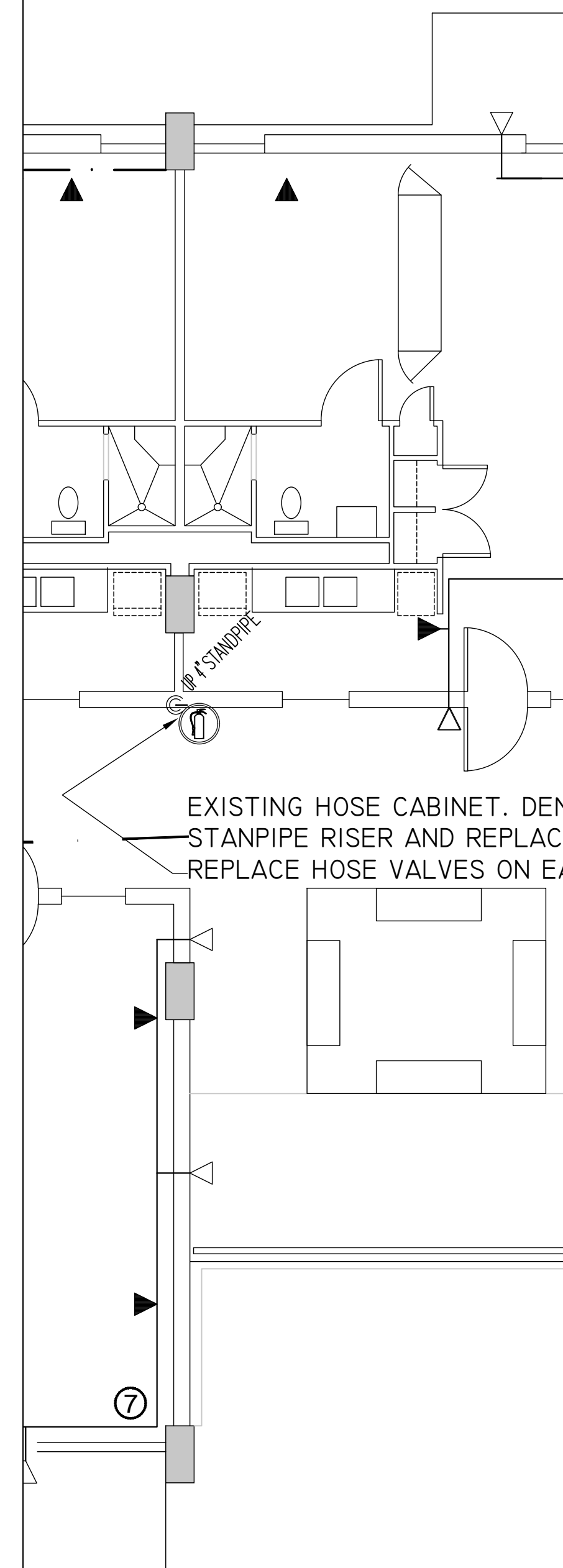
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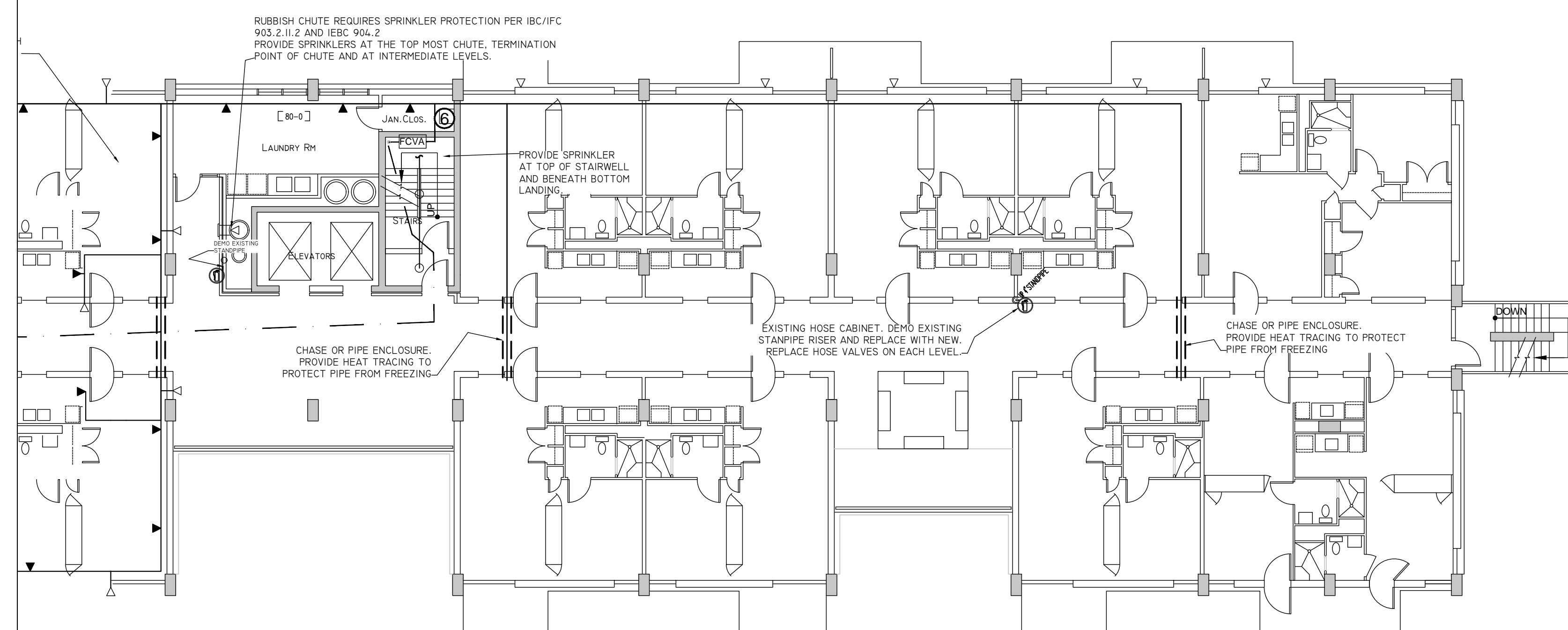
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FS 200

ACS-PCM-5 OR EQUIVALENT.
 7. LOCATE PIPING IN UNITS AS CLOSE TO WALLS AS POSSIBLE. USE LOW PROFILE HANGER TO BRING PIPE AS CLOSE TO CEILING AS POSSIBLE.



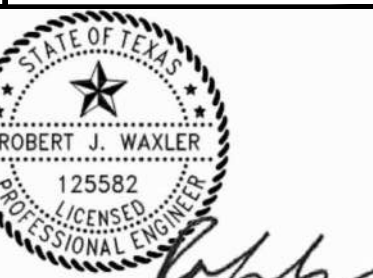
3 PARTIAL BUILDING SECTION
 SCALE: 1/4" = 1'-0"



P 210 :: 699 :: 9090
 F 210 :: 699 :: 6426
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Upper Level and Enlarged Unit Plan
 San Antonio Housing Authority
 PHASE B - Fire Protection Systems & Life Safety Renovations
 Villa Tranchese Apartments
 307 Marshall Street
 San Antonio, Texas



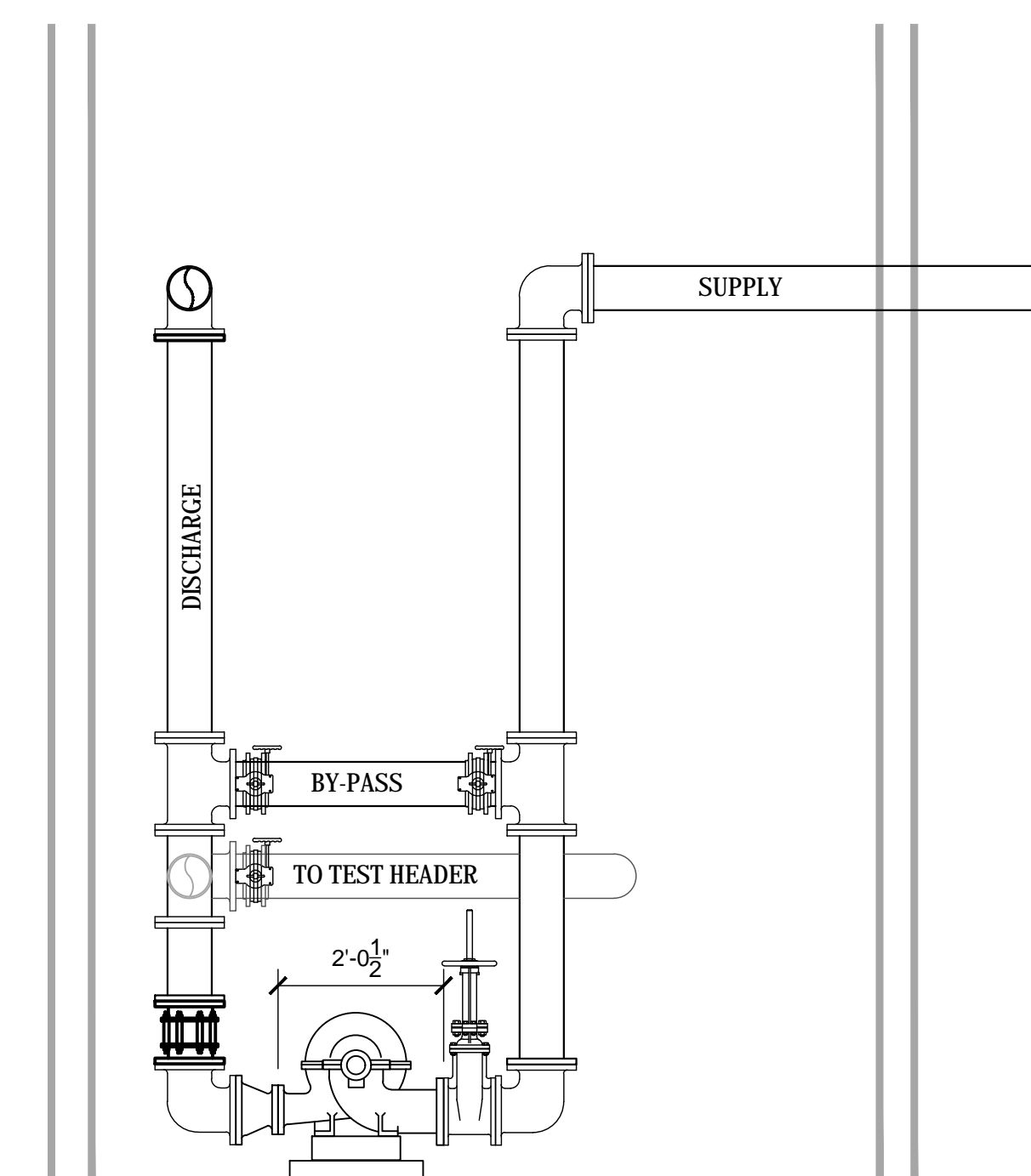
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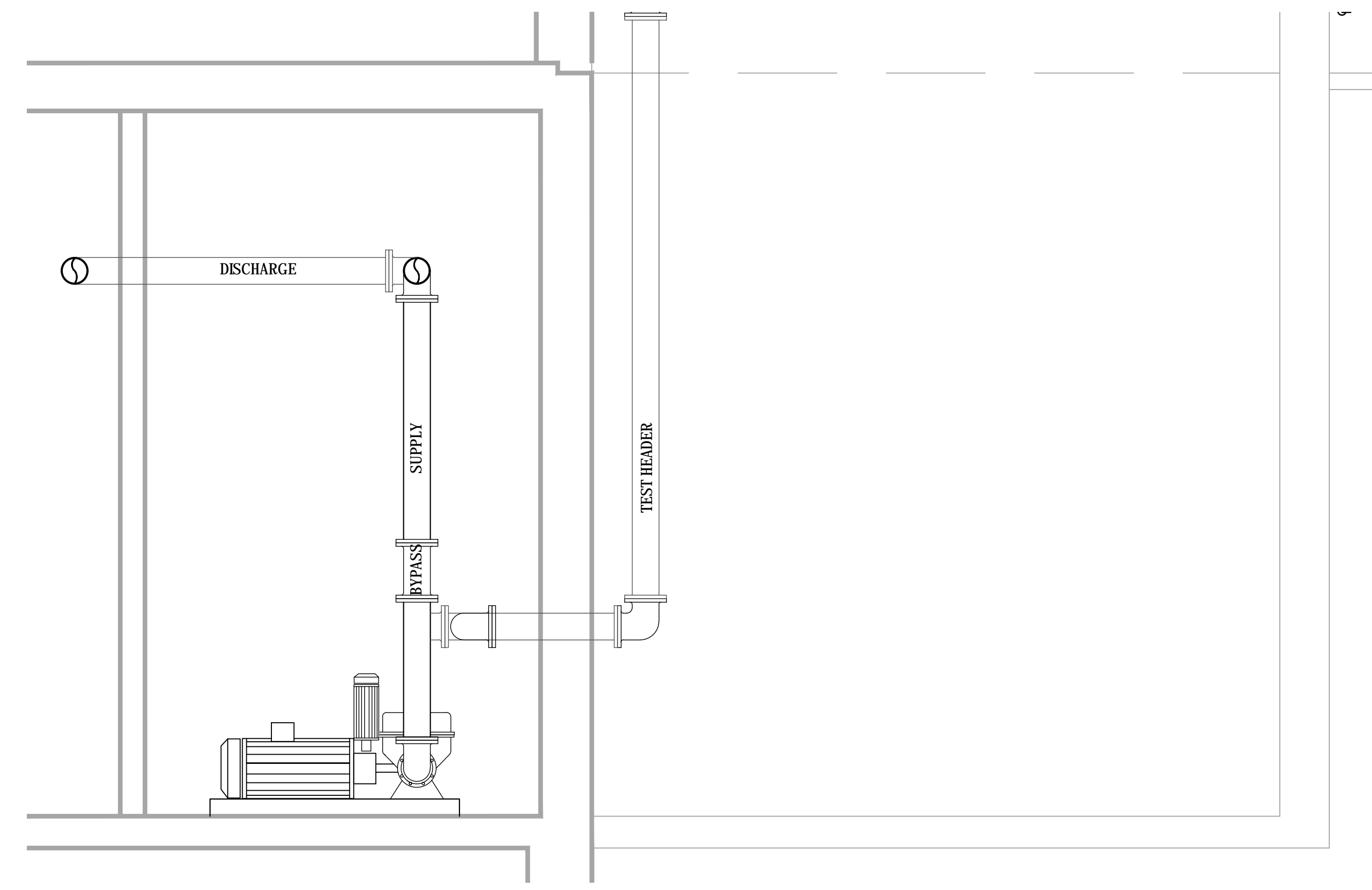
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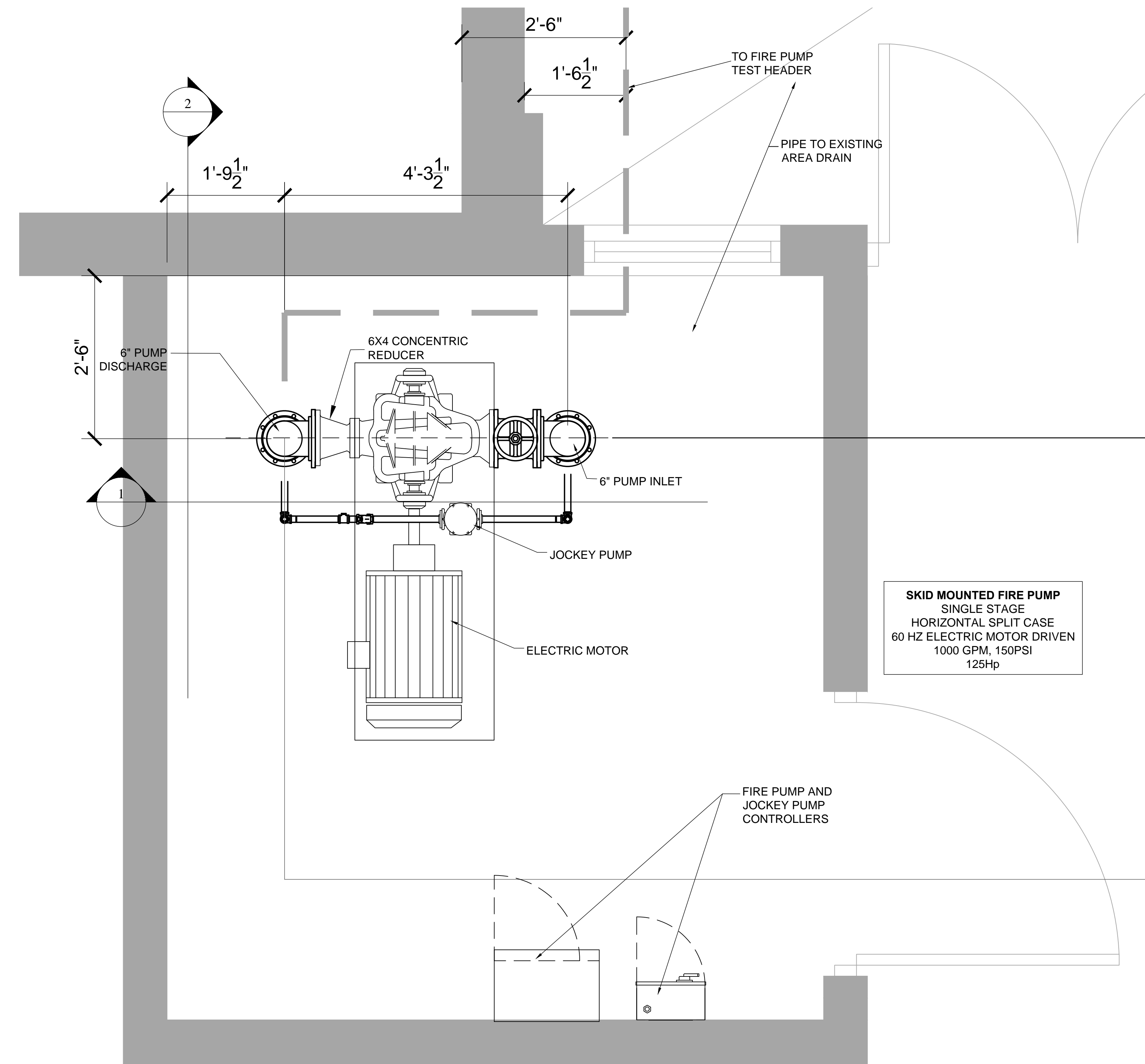
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FS 201



2 PUMP ROOM SECTION
SCALE: 1/2" = 1'-0"



1 PUMP ROOM SECTION
SCALE: 1/2" = 1'-0"

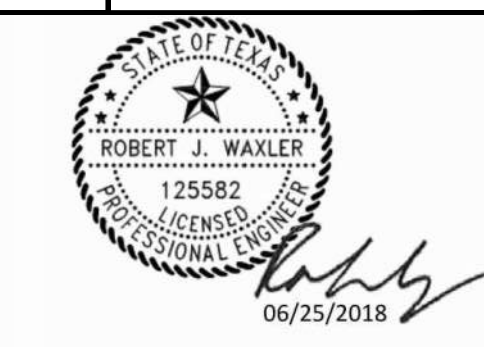


2 ENLARGED PUMP ROOM PLAN
SCALE: 1" = 1'-0"

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Pump Room and Sprinkler Details
San Antonio Housing Authority
PHASE B - Fire Protection Systems & Life Safety Renovations
Villa Tranchese Apartments
 307 Marshall Street
 San Antonio, Texas



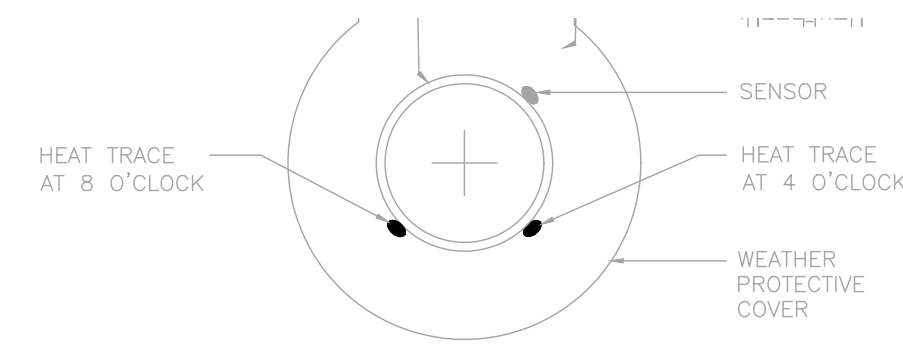
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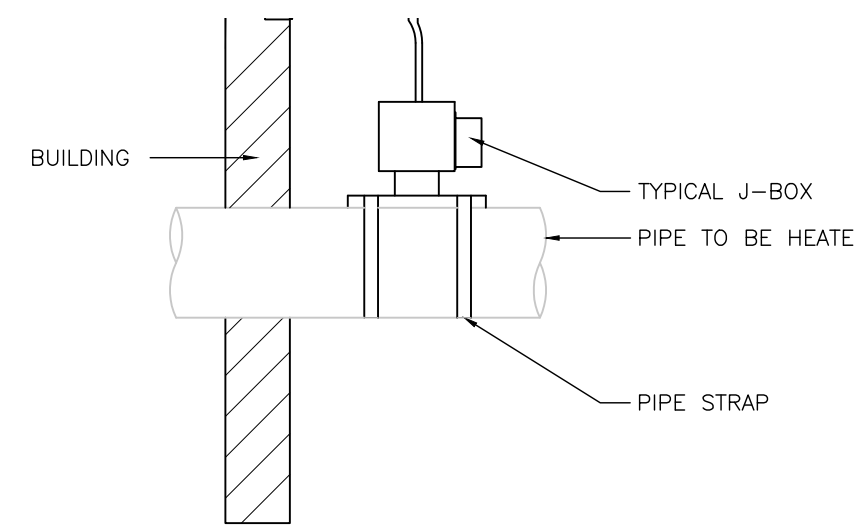
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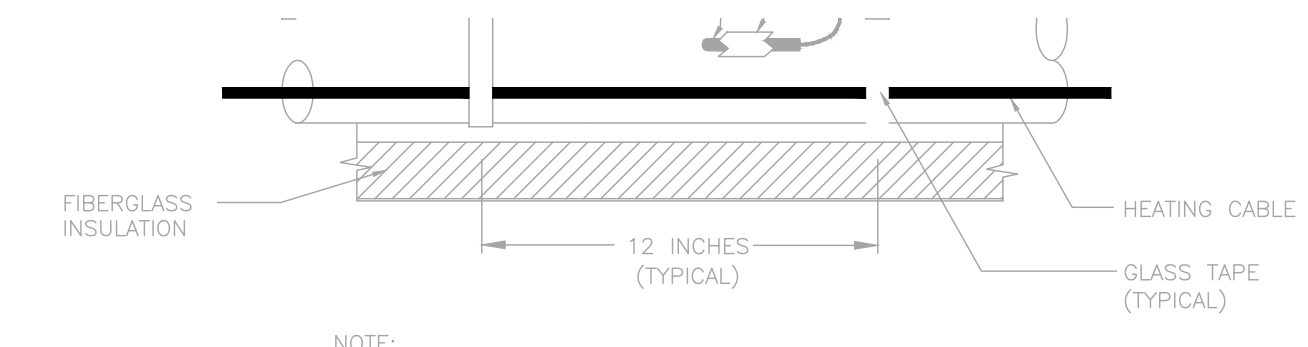


TYPICAL DETAILS:
INSULATE OVER ENTIRE PIPE AREA.
ALL INSULATION TO BE PROTECTED FROM WEATHER USING APPROVED METHODS.

10 HEAT TRACE PIPE SECTION
NTS

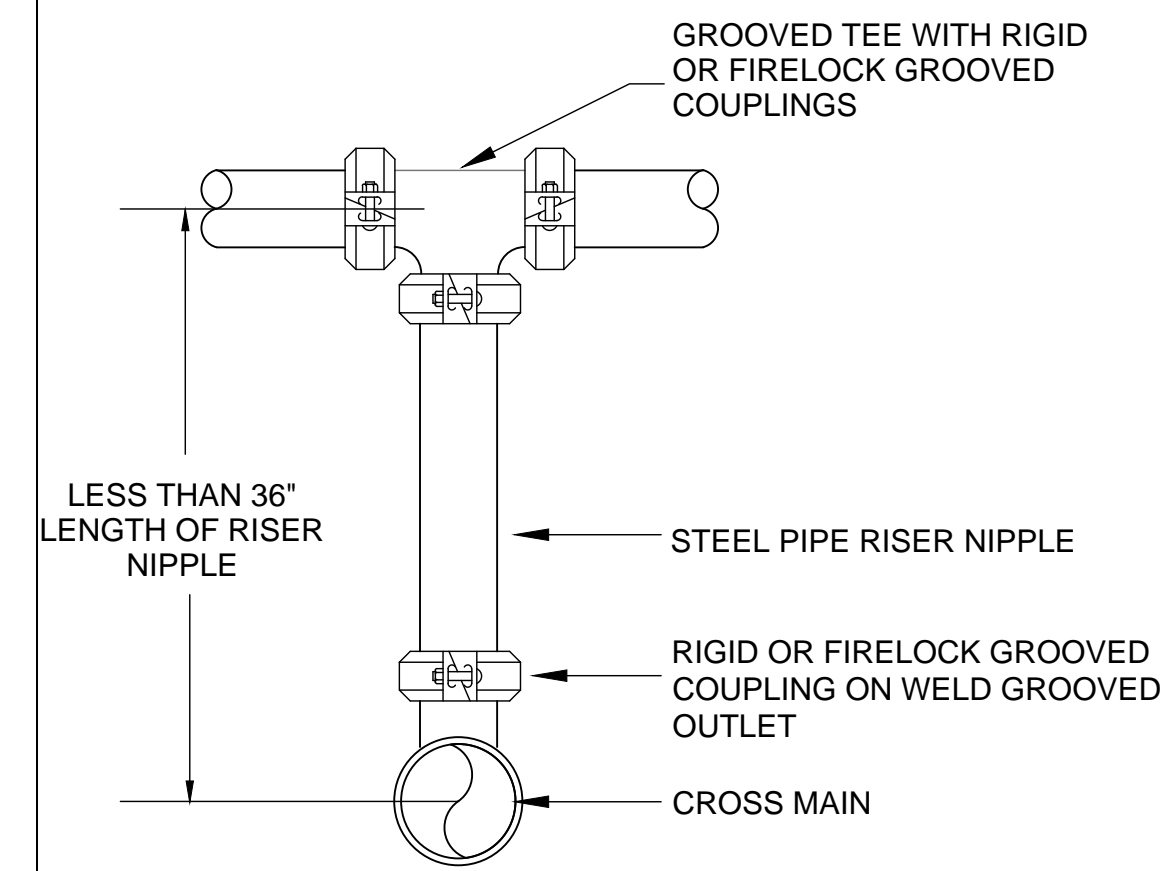


10 HEAT TRACE POWER CONNECTION
NTS

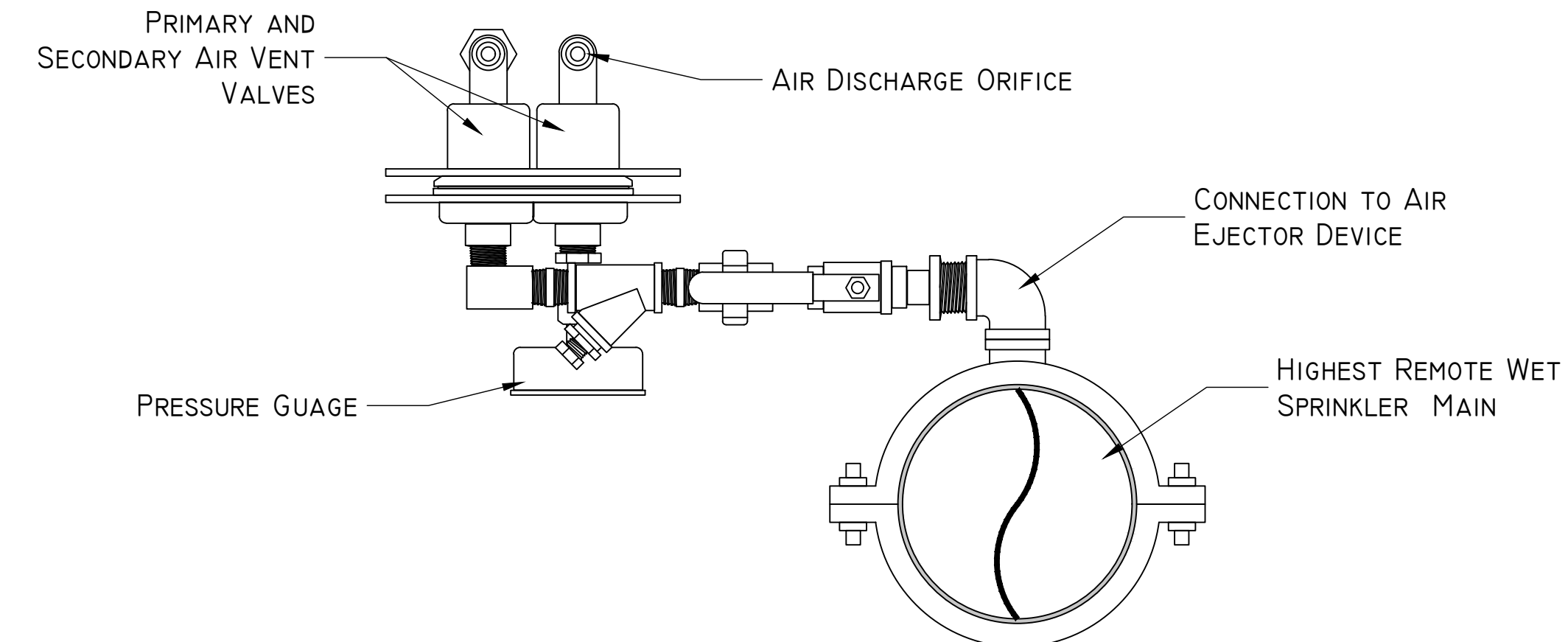


NOTE:
A STRIP OF ALUMINUM TAPE SHOULD BE APPLIED OVER THE THERMOSTAT BULB TO IMPROVE HEAT TRANSFER.
TYPICAL PLACEMENT OF HEATING CABLE WITH PIPE OVER TEMPERATURE CUT-OUT AND TEMPERATURE SENSOR.

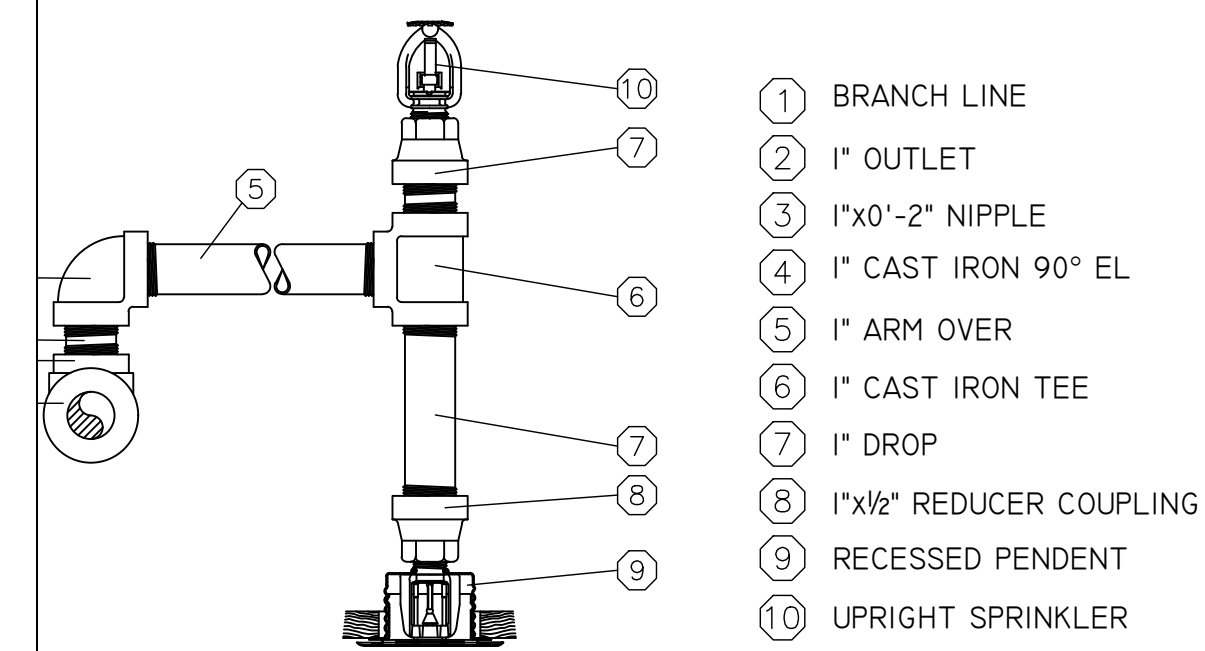
10 HEAT TRACE DETAIL
NTS



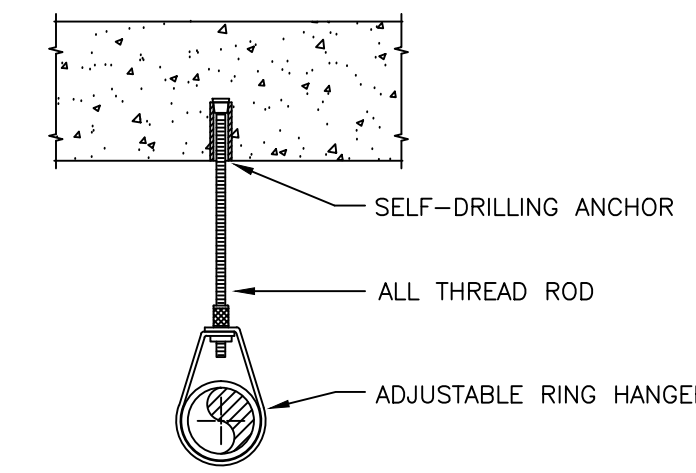
RISER DETAIL
NTS



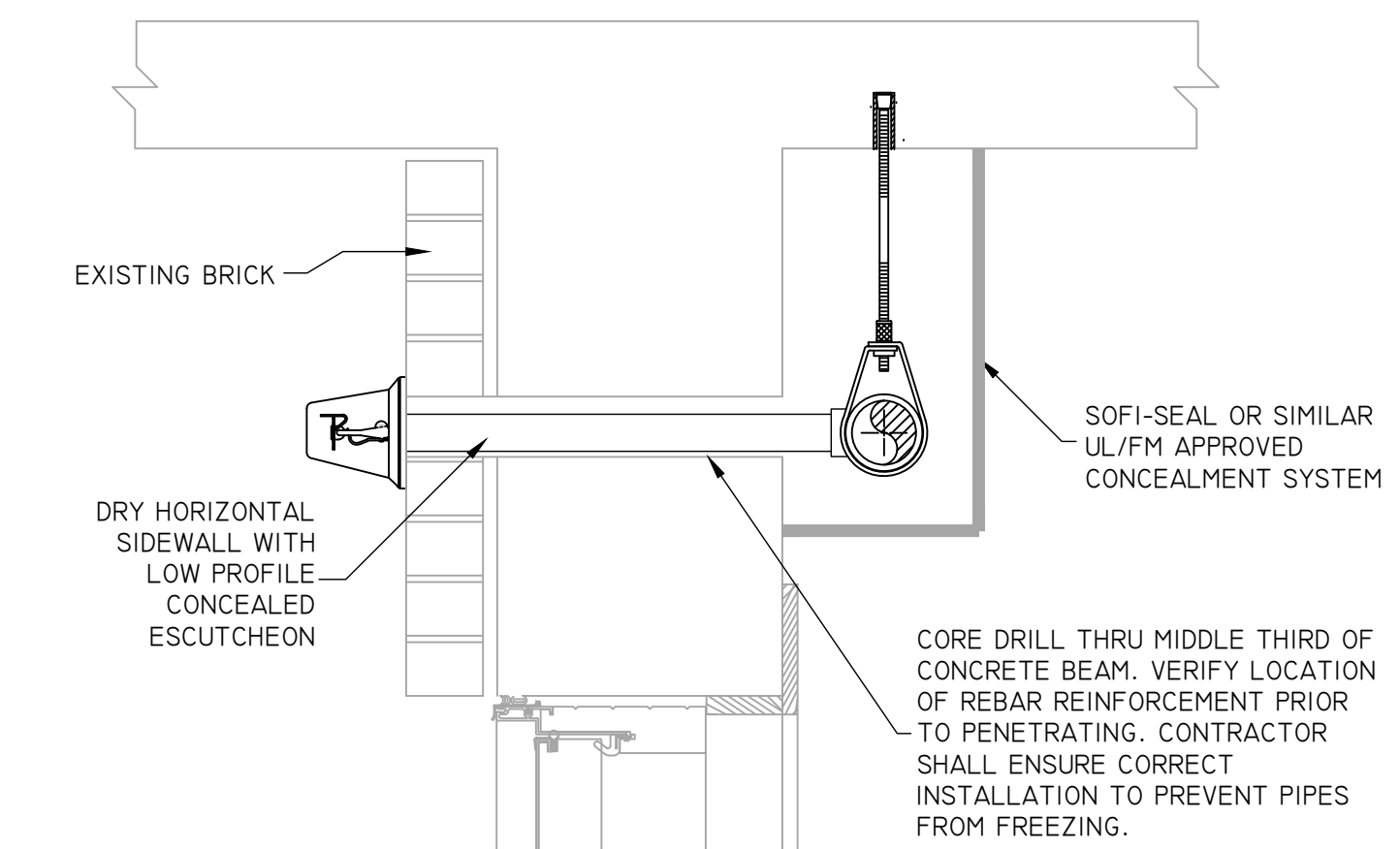
12 AIR EJECTOR DETAIL
NTS



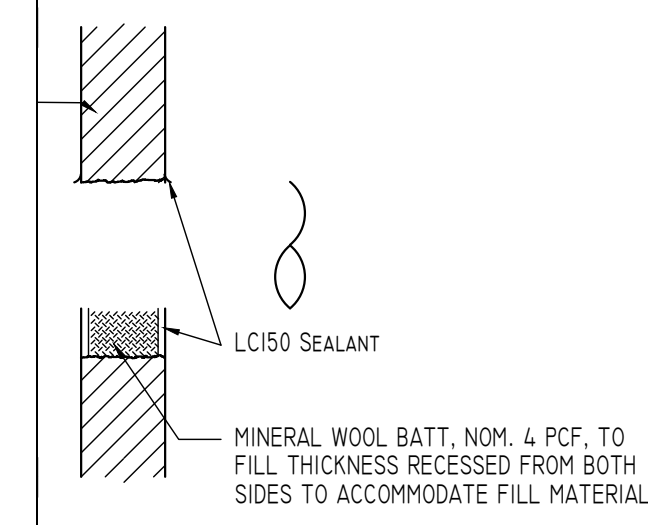
ARMOROVER DETAIL
NTS



8 HANGER DETAIL
NTS

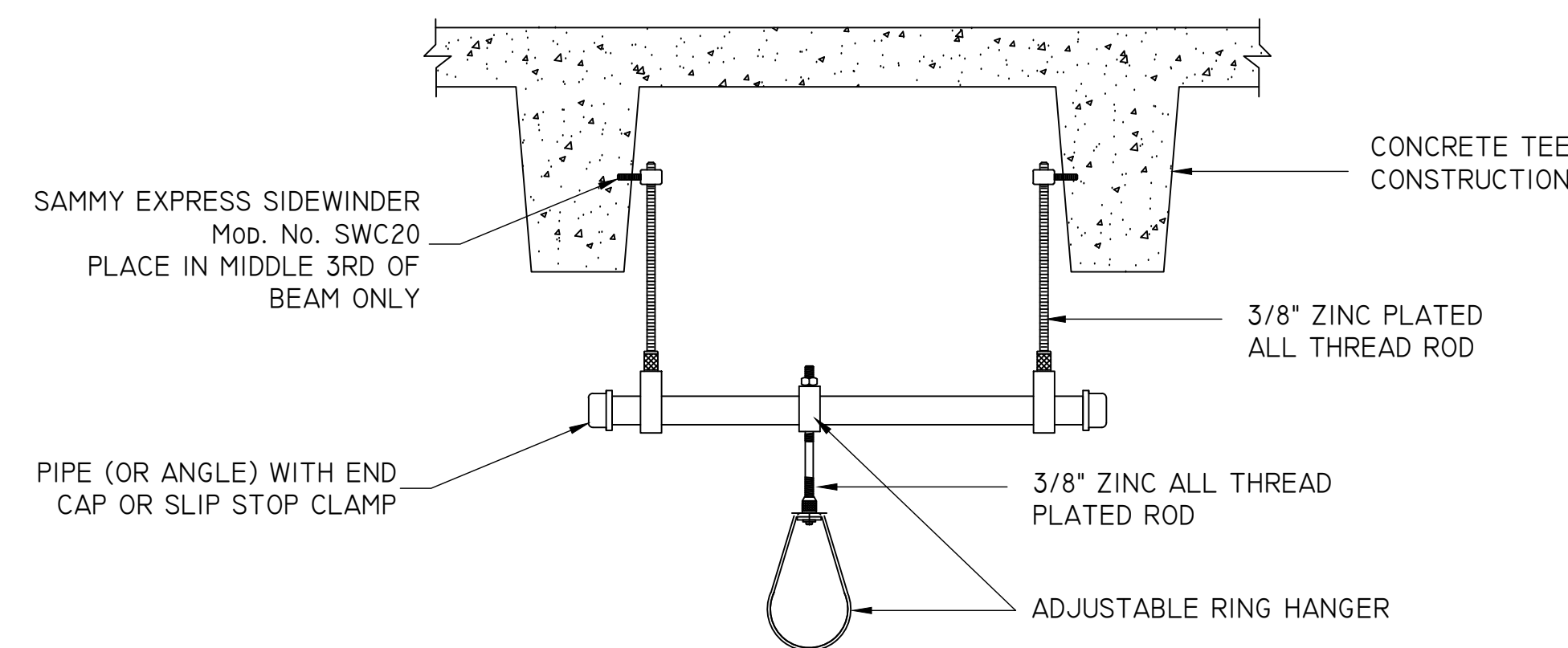


8 DRY SIDEWALL INSTALLATION DETAIL
NTS

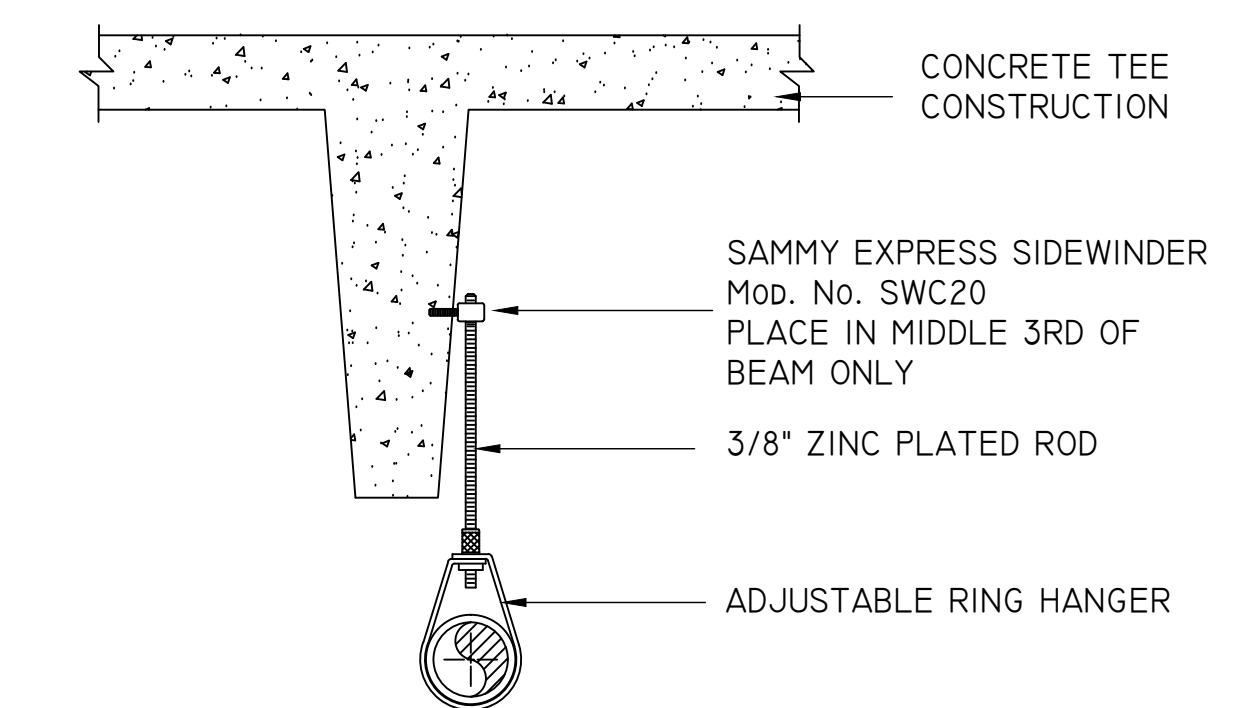


MINERAL WOOL	ANNULUS	
	MINIMUM	MAXIMUM
3"	POINT CONTACT	2"
N/A	POINT CONTACT	1-1/2"
3"	POINT CONTACT	2"

PP FOR METALLIC PIPING
LLS USING LCI50 SEALANT
OR APPROVED EQUAL.



6 HANGER DETAIL IN BASEMENT
NTS

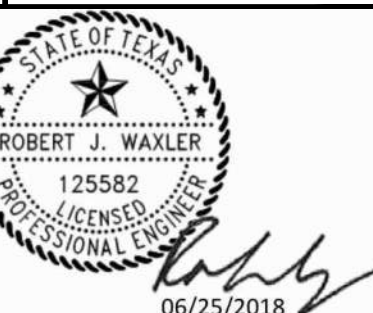


5 HANGER DETAIL IN BASEMENT
NTS

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Sprinkler System Details
San Antonio Housing Authority
Fire Protection Systems & Life Safety Renovations
Villa Tranchese Apartments
 307 Marshall Street
 San Antonio, Texas



Fire Protection Consulting Group, LLC
Texas PE Firm # 15865

REVISIONS:

No.	DATE	DESCRIPTION
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FS 301

GENERAL SPECIFICATIONS

1. CONCRETE MASONRY

- A. MORTAR SHALL BE ASTM C270 TYPE S f_c=1800 PSI @ 28 DAYS.
- B. GROUT SHALL BE ASTM C476 WITH f_c=2000 PSI @ 28 DAYS. SLUMP SHALL BE 9"± 1". ALL CELLS CONTAINING VERTICAL REINFORCING AND ALL BOND BEAMS SHALL BE GROUT FILLED.
- C. CONCRETE BLOCK UNITS SHALL BE NORMAL WEIGHT ASTM C90 GRADE N-1 WITH f_m=2000 PSI @ 28 DAYS AS VERIFIED BY PRISM TESTS.
- D. WALLS SHALL BE REINFORCED WITH GRADE 60 DEFORMED BARS AS INDICATED ON DRAWINGS.
- E. MASONRY UNITS SHALL BE PLACED IN COURSES OF REGULAR RUNNING BOND.
- F. A MINIMUM OF 24 HOURS SHALL ELAPSE BETWEEN COMPLETION OF THE LAYOUT OF A WALL SECTION AND GROUTING.
- G. PROVIDE (2) #5 BARS (VERT) AND FOUNDATION DOWELS EACH SIDE OF DOOR AND WALL OPENINGS GREATER THAN 24". EXTEND REINFORCING TO THE NEXT FLOOR OR ROOF LINE ABOVE, UNLESS DETAILED OTHERWISE.
- H. LAP ALL BARS AT SPLICES 50 BAR DIAMETERS, WITH A MINIMUM LAP SPLICE OF 24" UNLESS NOTED OTHERWISE.
- I. REINFORCE AROUND OPENINGS WITH (2) #5 BARS (HORIZ) AT HEAD AND SILL OF OPENINGS. EXTEND REINFORCING EACH WAY 24" BEYOND OPENING, UNLESS NOTED OTHERWISE.
- J. COORDINATE THE PLACEMENT OF DOWELING FROM THE FOUNDATION TO THE MASONRY WALLS SO AS TO PROVIDE (1) #5 BAR X 4'-0" AT EACH VERTICAL MASONRY WALL BAR EMBEDDED 2'-0" INTO CONCRETE, OR PROVIDE STANDARD 90 DEGREE HOOK AND EMBED 1'-0" INTO CONCRETE, UNLESS NOTED OTHERWISE.
- K. PROVIDE 2'-0" X 2'-0" BARS AT CORNERS AND INTERSECTIONS FOR WALLS EQUAL IN SIZE AND NUMBER TO HORIZONTAL REINFORCING AND (1) #5 BAR (VERT) AT ENDS OF WALL AND AT WALL INTERSECTIONS.
- L. FOR HIGH LIFT GROUTING, PROVIDE BAR POSITIONERS AT 200 BAR DIAMETER INTERVALS, MAXIMUM, FOR VERTICAL REINFORCING, CONSOLIDATE AND RECONSOLIDATE GROUT BY MECHANICAL VIBRATION.
- M. AT TIME OF LAYING, DO NOT WET CONCRETE MASONRY UNITS.
- N. ROUGHEN CONSTRUCTION JOINTS BETWEEN CONCRETE AND MASONRY AND CLEAN TO A FULL AMPLITUDE OF 1/8 INCH, UNLESS NOTED OTHERWISE.
- O. PROPERLY STORE MASONRY MATERIALS TO PREVENT CONTAMINATION AND DETERIORATION.

2. NONSHRINK GROUT

- A. CEMENTITIOUS GROUT:
 - 1. NONSHRINKABLE GROUT CONFORMING TO ASTM C1107, GRADE A AND CRD-621, CORPS OF ENGINEERS "SPECIFICATION FOR NONSHRINK GROUT". GROUT SHALL HAVE A MINIMUM SPECIFIED COMPRESSIVE STRENGTH AT 28 DAYS OF 5,000 PSI.
 - 2. ROUGHEN CONCRETE SUBSTRATE WITH A BUSH HAMMER TO A MINIMUM 1/4" AMPLITUDE, WASH CLEAN, AND SATURATE WITH WATER FOR 24 HOURS PRIOR TO GROUT PLACEMENT. REMOVE STANDING WATER PRIOR TO GROUT PLACEMENT.
 - 3. SURFACES IN CONTACT WITH GROUT SHALL BE FREE OF OIL, GREASE, LAITANCE, AND OTHER CONTAMINANTS.
 - 4. CUT BACK GROUT THAT IS ABOVE THE UNDERSIDE OF THE BASEPLATE TO LOWER EDGE OF THE BASEPLATE AND TAPER DOWN TO THE CONCRETE SUBSTRATE.
 - 5. ANCHOR BOLT SLEEVES AND HOLES: GROUT PRIOR TO PLACING GROUT BENEATH BASEPLATE.
 - 6. SUBMIT GROUT MATERIAL SPECIFICATIONS TO ENGINEER OF RECORD FOR REVIEW.
- B. EPOXY GROUT:
 - 1. PREPACKAGED, THREE COMPONENT COMPOUND (RESIN, HARDENER AND AGGREGATE), NONSHRINKABLE GROUT WITH A MAXIMUM 2.0 PERCENT EXPANSION CONFORMING TO ASTM C827, MODIFIED TO USE A BALL WITH A SPECIFIC GRAVITY BETWEEN 0.9 AND 1.1. GROUT SHALL HAVE A MINIMUM SPECIFIED COMPRESSIVE STRENGTH AT SEVEN DAYS OF 10,000 PSI. MAXIMUM COEFFICIENT OF THERMAL EXPANSION SHALL BE 30 X 10⁻⁶ IN/IN/°F.
 - 2. ROUGHEN CONCRETE SUBSTRATE WITH A BUSH HAMMER TO A MINIMUM AMPLITUDE OF 1/4", CLEAN AND COMPLETELY DRY.
 - 3. STEEL SURFACES IN CONTACT WITH EPOXY GROUT TO HAVE AN SSPC-SP6 COMMERCIAL FINISH.
 - 4. SUBMIT GROUT MATERIAL SPECIFICATIONS TO ENGINEER OF RECORD FOR REVIEW.

3. STRUCTURAL STEEL AND MISCELLANEOUS IRON

- A. STRUCTURAL STEEL:
 - 1. CHANNELS, ANGLES AND PLATES: A36, UNLESS NOTED OTHERWISE.
- B. STRUCTURAL STEEL FINISH: ALL STRUCTURAL STEEL SHALL BE HOT-DIP GALVANIZED, G-60.
- C. POST-INSTALLED ANCHORS IN CONCRETE AND MASONRY:
 - 1. EXPANSION ANCHORS: ICC-ES APPROVED STAINLESS STEEL (EQUIVALENT TO AISI 304) TORQUE CONTROLLED, MECHANICAL EXPANSION ANCHORS. ACCEPTABLE ANCHORS FOR USE IN CONCRETE ARE HILTI KWIK BOLT-TZ (ICC ESR-1917) AND FOR USE IN GROUT FILLED MASONRY ARE HILTI KWIK BOLT 3 (ICC ESR-1385) AS MANUFACTURED BY HILTI FASTENING SYSTEMS, INC. INSTALL ANCHORS ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS AND THE APPLICABLE ICC-ES REPORT.
 - 1.1 EXPANSION ANCHOR EFFECTIVE EMBEDMENT, UNLESS NOTED OTHERWISE:
 - i. 3/8" Ø WITH 4" MINIMUM EMBEDMENT
 - ii. 1/2" Ø WITH 3" MINIMUM EMBEDMENT
 - iii. 5/8" Ø WITH 5" MINIMUM EMBEDMENT iv. 3/4" Ø WITH 6" MINIMUM EMBEDMENT
 - 2. ADHESIVE ANCHORS: ICC-ES APPROVED, CONSISTING OF ALL-THREAD ANCHOR ROD, NUT WASHER, AND ADHESIVE SYSTEM. ANCHOR RODS SHALL BE AISI 304/316 STAINLESS STEEL, UNLESS NOTED OTHERWISE. ACCEPTABLE ADHESIVE SYSTEM IS THE HILTI HIT-RE 500-SD ADHESIVE SYSTEM AS MANUFACTURED BY THE HILTI FASTENING SYSTEMS, INC. OR APPROVED EQUAL. INSTALL ANCHORS IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND THE APPLICABLE ICC-ES REPORT.
 - 2.1 ADHESIVE ANCHOR EMBEDMENT, UNLESS NOTED OTHERWISE:
 - i. 3/8" Ø WITH 3" MINIMUM EMBEDMENT
 - ii. 1/2" Ø WITH 4" MINIMUM EMBEDMENT
 - iii. 5/8" Ø WITH 5" MINIMUM EMBEDMENT
 - iv. 3/4" Ø WITH 6" MINIMUM EMBEDMENT

4. CONCRETE - CAST-IN-PLACE

- A. ALL CONCRETE SHALL DEVELOP A MINIMUM 28 DAY LABORATORY-CURED COMPRESSIVE CYLINDER STRENGTH OF 4000 PSI, UNLESS NOTED OTHERWISE.
- B. CONCRETE EXPOSED TO ELEMENTS: AIR CONTENT SHALL BE IN ACCORDANCE WITH ACI 201.2R-08 TABLE 4.1 FOR MODERATE EXPOSURE CONDITION.
- C. PROVIDE A MINIMUM OF 3 CONCRETE TEST CYLINDERS FOR EACH 100 CUBIC YARDS, OR EACH DAY OF POUR FOR EACH CONCRETE STRENGTH. TEST CYLINDERS AS FOLLOWS: ONE AT SEVEN DAYS, TWO AT 28 DAYS. TAKE ONE ADDITIONAL TEST CYLINDER DURING COLD WEATHER CONCRETING, CURED ON THE PROJECT SITE UNDER THE SAME CONDITIONS AS THE CONCRETE IT REPRESENTS.
- D. CONCRETE CYLINDER SAMPLING AND TESTING: CONFORM WITH ASTM SPECIFICATIONS. ACCEPTANCE OF CONCRETE SHALL BE GOVERNED BY THE PROVISIONS OF ACI 318 "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE". SUBMIT MIX DESIGNS, WITH COMPLETE STATISTICAL BACKUP, FOR REVIEW.
- E. CONCRETE MATERIALS, FORM WORK, MIXING, PLACING, AND CURING CONFORM TO SPECIFICATIONS CONTAINED IN THE ACI "MANUAL OF CONCRETE PRACTICE".
- F. AT AREAS OF DEPRESSIONS FOR SLABS AND BEAMS, PROVIDE MINIMUM THICKNESS OF DEPTH AS FOR ADJACENT AREAS, UNLESS OTHERWISE NOTED.
- G. DO NOT PLACE CONCRETE ON FROZEN GROUND.
- H. EXPOSED CORNERS: 3/4" CHAMFER, UNLESS NOTED OTHERWISE.
- I. REINFORCING STEEL AND POST-INSTALLED ANCHORS TO BE INSTALLED INTO EXISTING CONCRETE SHALL BE ACCOMPLISHED WITH AN ICC-ES APPROVED SYSTEM SUCH AS HILTI HIT-RE 500-SD, OR APPROVED EQUAL. DRILL HOLES BY ROTARY PERCUSSIVE METHODS ONLY. DO NOT CUT OR DAMAGE EXISTING REINFORCING STEEL DURING DRILLING AND INSTALLATION OF NEW REINFORCING DOWELS OR POST-INSTALLED ANCHORS. INSTALLATION SHALL BE IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND THE APPLICABLE ICC-ES REPORT.

6. HOLLOW METAL DOORS AND FRAMES

- A. PROVIDE PRODUCT DATA SUBMITTALS FOR DOORS, FRAMES AND HARDWARE COMPONENTS.
- B. FIRE RATED AS INDICATED.
- C. HEAVY DUTY DOOR AND FRAME PER SDIA250.8, LEVEL 2.
- D. FACE: UNCOATED STEEL SHEET, MINIMUM THICKNESS OF 0.042 INCH.
- E. EDGE CONSTRUCTION: MODEL 1, FULL FLUSH.
- F. CORE: MANUFACTURER'S STANDARD.
- G. FRAMES: FACE-WELDED, UNCOATED STEEL SHEET, MINIMUM THICKNESS OF 0.053 INCH.
- H. EXPOSED FINISH: PRIME.
- I. ANCHOR FRAMES TO CONCRETE MASONRY AND FILL FRAMES WITH GROUT.
- J. DOOR HARDWARE: STAINLESS STEEL HINGES AND PINS, LEVER HANDLES AND LATCH/STRIKE, MODERN TYPE SURFACE CLOSER WITH COVER.

7. INTERIOR PAINTING

- A. PROVIDE PRODUCT DATA SUBMITTALS FOR EACH TYPE OF PRODUCT INCLUDING PREPARATION REQUIREMENTS AND APPLICATION INSTRUCTIONS.
- B. CONCRETE MASONRY UNITS:
 - 1. BLOCK FILLER: BLOCK FILLER, LATEX, INTERIOR/EXTERIOR.
 - 2. INTERMEDIATE COAT: LATEX, INTERIOR, MATCHING TOPCOAT.
 - 3. TOPCOAT: LATEX, INTERIOR, SEMI-GLOSS (MPI GLOSS LEVEL 5).
- C. STEEL (INTERIOR):
 - 1. PRIME COAT: FACTORY APPLIED
 - 2. INTERMEDIATE COAT: LATEX, INTERIOR, MATCHING TOPCOAT.
 - 3. TOPCOAT: LATEX, INTERIOR, SEMI-GLOSS (MPI GLOSS LEVEL 5).
- D. STEEL (EXTERIOR - GALVANIZED STEEL)
 - 1. PRIME COAT: PRIMER, GALVANIZED, WATER BASED
 - 2. INTERMEDIATE COAT: LIGHT INDUSTRIAL COATING, EXTERIOR, WATER BASED, MATCHING TOPCOAT.
 - 3. TOPCOAT: LIGHT INDUSTRIAL COATING, EXTERIOR, WATER BASED, GLOSS (MPI GLOSS LEVEL 6).
- E. GYPSUM BOARD
 - 1. PRIME COAT: LATEX, INTERIOR, MATCHING TOPCOAT.
 - 2. INTERMEDIATE COAT: LATEX, INTERIOR, MATCHING TOPCOAT.
 - 3. TOPCOAT: LATEX, INTERIOR, GLOSS LEVEL TO MATCH EXISTING.

TABLE #1- STATEMENT OF SPECIAL INSPECTIONS

REQUIRED VERIFICATION AND INSPECTION OF MASONRY CONSTRUCTION

VERIFICATION AND INSPECTION TASK	CONTINUOUS	PERIODIC
1. COMPLIANCE WITH REQUIRED INSPECTION PROVISIONS OF THE CONSTRUCTION DOCUMENTS AND THE APPROVED SUBMITTALS SHALL BE VERIFIED.	—	X
2. VERIFICATION OF F _{pr} AND F _{pu} PRIOR TO CONSTRUCTION EXCEPT WHERE SPECIFICALLY EXEMPTED BY THE CODE.	—	X
3. VERIFICATION OF SLUMP FLOW AND VSI AS DELIVERED TO THE SITE FOR SELF-CONSOLIDATING GROUT.	X	—
4. AS MASONRY CONSTRUCTION BEGINS, THE FOLLOWING SHALL BE VERIFIED TO ENSURE COMPLIANCE:		
A. PROPORTIONS OF SITE-PREPARED MORTAR.	—	X
B. CONSTRUCTION OF MORTAR JOINTS.	—	X
C. LOCATION OF REINFORCEMENT CONNECTORS, AND ANCHORAGES.	—	X
5. DURING CONSTRUCTION THE INSPECTION PROGRAM SHALL VERIFY:		
A. SIZE AND LOCATION OF STRUCTURAL ELEMENTS.	—	X
B. TYPE, SIZE AND LOCATION OF ANCHORS, INCLUDING OTHER DETAILS OF ANCHORAGE OF MASONRY TO STRUCTURAL MEMBERS, FRAMES OR OTHER CONSTRUCTION.	—	X
C. SPECIFIED SIZE, GRADE AND TYPE OF REINFORCEMENT, ANCHOR BOLTS, AND ANCHORAGES.	—	X
D. PREPARATION, CONSTRUCTION AND PROTECTION OF MASONRY DURING COLD WEATHER (TEMPERATURE BELOW 40°F) OR HOT WEATHER (TEMPERATURE ABOVE 90°F)	—	X
6. PRIOR TO GROUTING, THE FOLLOWING SHALL BE VERIFIED TO ENSURE COMPLIANCE:		
A. GROUT SPACE IS CLEAN.	—	X
B. PLACEMENT OF REINFORCEMENT AND ANCHORAGES.	—	X
C. PROPORTIONS OF SITE-PREPARED GROUT.	—	X
D. CONSTRUCTION OF MORTAR JOINTS.	—	X
7. GROUT PLACEMENT	X	—
8. PREPARATION OF ANY REQUIRED GROUT SPECIMENS, MORTAR SPECIMENS AND/OR PRISMS SHALL BE OBSERVED.	—	X

NOTES:

- 1. SPECIAL INSPECTOR: A QUALIFIED PERSON WHO DEMONSTRATES HIS COMPETENCE, TO THE SATISFACTION OF THE BUILDING OFFICIAL, FOR INSPECTION OF THE PARTICULAR TYPE OF CONSTRUCTION OR OPERATION REQUIRING SPECIAL INSPECTION. THE SPECIALINSPECTOR SHALL BE EMPLOYED BY THE CONTRACTOR.
- 2. DUTIES AND RESPONSIBILITIES OF THE SPECIAL INSPECTOR:
 - A. OBSERVES THE WORK ASSIGNED FOR CONFORMANCE WITH THE APPLICABLE DESIGN DRAWINGS AND SPECIFICATIONS.
 - B. FURNISHES INSPECTION REPORTS TO THE AUTHORITY HAVING JURISDICTION, ENGINEER, AND OTHER DESIGNATED PERSONS. DISCREPANCIES SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE CONTRACTOR FOR CORRECTION, THEN, IF UNCORRECTED, TO THE PROPER DESIGN AUTHORITY AND AUTHORITY HAVING JURISDICTION.
 - C. SUBMITS A FINAL SIGNED REPORT STATING WHETHER THE WORK REQUIRING SPECIAL INSPECTION WAS, TO THE BEST OF THE INSPECTOR'S KNOWLEDGE, IN CONFORMANCE WITH THE APPROVED PLANS AND SPECIFICATIONS AND THE APPLICABLE WORKMANSHIP PROVISIONS OF THE GOVERNING CODE.
- 3. DUTIES AND RESPONSIBILITIES OF THE CONTRACTOR REGARDING SPECIAL INSPECTION:
 - A. THE CONTRACTOR IS RESPONSIBLE FOR NOTIFYING THE SPECIAL INSPECTOR WHEN ITEMS NOTED ABOVE ARE TO BE INSPECTED.
 - B. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE SPECIAL INSPECTOR ACCESS TO ITEMS REQUIRING SPECIAL INSPECTION.
- 4. THE TERM "CONTINUOUS," AS STATED ABOVE, SHALL MEAN THE SPECIAL INSPECTOR IS ON THE SITE AND IN THE GENERAL AREA, AT ALL TIMES, OBSERVING THE WORK REQUIRING SPECIAL INSPECTION.
- 5. THE TERM "PERIODIC" MEANS THAT THE SPECIAL INSPECTOR IS ON SITE AT TIME INTERVALS NECESSARY TO CONFIRM THAT THE WORK REQUIRING SPECIAL INSPECTION IS IN CONFORMANCE WITH APPROVED PERMIT PLANS AND SPECIFICATIONS.
- 6. SPECIAL INSPECTION IS NOT REQUIRED WHEN WORK IS PERFORMED IN AN APPROVED FABRICATOR'S SHOP IN ACCORDANCE WITH IBC SECTION 1704.2.5.2.
- 7. POST-INSTALLED CONCRETE ANCHORS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS AND THE APPLICABLE ICC EVALUATION SERVICES REPORT (ICC ESR). PERIODIC SPECIAL INSPECTION SHALL BE PROVIDED IN ACCORDANCE WITH SECTION 1705.1.1 OF THE IBC TO VERIFY THAT THE ANCHOR INSTALLATION MEETS THE REQUIREMENTS OF THE APPLICABLE ICC-ESR. CONTINUOUS SPECIAL INSPECTION IS REQUIRED FOR ALL CASES WHERE ANCHORS INSTALLED OVERHEAD (VERTICAL UP) ARE DESIGNED TO RESIST SUSTAINED TENSION LOADS.

8. ABBREVIATIONS

- AB(S) = ANCHOR BOLT(S)
- ADIP = AUGER CAST IN PLACE
- ADD = ADDENDUM
- ADDL = ADDITIONAL
- ANCH(S) = ANCHOR(S)
- AR(S) = ANCHOR ROD(S)
- ARCH = ARCHITECT
- BLOC = BUILDING
- BLKG = BLOCKING
- BM = BEAM
- BO = BOTTOM OF
- BOF = BOTTOM OF FOOTING/FOUNDATION
- BOS = BOTTOM OF STEEL
- BOTT = BOTTOM
- BP = BASE PLATE
- BRG = BEARING
- BTWN = BETWEEN
- CHK = CHECKERED
- CP = CAST-IN-PLACE
- CJ = CONTROL OR CONSTRUCTION JOINT
- CTR(D) = CENTER(D)
- L OR CL = CENTER LINE
- CLR = CLEAR
- CMU = CONCRETE MASONRY UNIT
- COL(S) = COLUMN(S)
- CONC = CONCRETE
- CONST = CONSTRUCTION
- CONN = CONNECTION
- CONT(D) = CONTINUED(D)/CONTINUATION
- CONTS = CONTINUOUS
- CJP = COMPLETE JOINT PENETRATION
- DBL = DOUBLE
- DEG = DEGREE
- DET = DETAIL
- DIA OR Ø = DIAMETER
- DIAG = DIAGONAL
- DIM(S) = DIMENSION(S)
- DL = DEAD LOAD
- DWG(S) = DRAWING(S)
- DL(S) = DOWEL(S)
- EA = EACH
- EF = EACH FACE
- ELEC = ELECTRICAL
- EL = EACH WAY
- EMBED = EMBEDMENT
- EO = EDGE OF
- EOS = EDGE OF SLAB
- EQ = EQUAL
- EQUIP = EQUIPMENT
- EW = EACH WAY
- EXIST(E) = EXISTING
- EXP = EXPANSION
- EXT = EXTERIOR
- FDN = FOUNDATION
- FL = FLOOR
- FLG = FLANGE
- FO = FACE OF
- FOC = FACE OF CONCRETE
- F.O.G. = FACE OF GIRT
- FOS = FACE OF STUD
- FOW = FACE OF WALL
- FRP = FIBERGLASS REINFORCED PLASTIC
- FS = FACE SIDE
- FT = FOOT
- FTG(S) = FOOTING(S)
- GA = GAUGE
- GR = GRADE
- GB = GRADE BEAM
- GND(G) = GROUNDING
- GRTG = GRATING
- HDG = HOT-DIPPED GALVANIZED
- HKG = HOUSEKEEPING
- HR = HANDRAIL
- HS = HEADED STUD
- HSS = HOLLOW STRUCTURAL SECTION
- HORIZ = HORIZONTAL
- HSS(B) = HIGH STRENGTH BOLT(S)
- HP = HIGH POINT
- ID = INSIDE DIAMETER
- IN = INCHES
- INFO = INFORMATION
- INT = INTERIOR
- INV = INVERT
- JT = JOINT
- LL = LEVEL LOAD
- LLH = LONG LEG HORIZONTAL
- LLV = LONG LEG VERTICAL
- LP = LOW POINT
- MAX = MAXIMUM
- MB(S) = MACHINE BOLT(S)
- MECH = MECHANICAL
- MFR(S) = MANUFACTURER(S)
- MIN = MINIMUM
- MISC = MISCELLANEOUS

(ABBREVIATIONS CONTINUED)

- (N) = NEW
- NOM = NOMINAL
- NS = NEAR SIDE
- NTS = NOT TO SCALE
- NSG = NONSHRINK GROUT
- NO.# = NUMBER
- NWC = NORMAL WEIGHT CONCRETE
- OC = ON CENTER
- OCF = ON CENTER EACH FACE
- OD = OUTSIDE DIAMETER
- O/O = OUT TO OUT
- OPER = OPERATING
- OPN(S) = OPENING(S)
- OPP HD = OPPOSITE HAND
- PC(S) = PIECE(S)
- PEB = PRE-ENGINEERED BUILDING(S)
- FLOR PL = PLATE
- PLC(S) = PLACE(S)
- +/- = PLUS OR MINUS
- PROJ = PROJECT/PROJECTION
- PLF = POUNDS PER LINEAL FOOT
- PSI = POUNDS PER SQUARE INCH
- PSF = POUNDS PER SQUARE FOOT
- R/RAD = RADIUS
- REF = REFERENCE
- REINF = REINFORCING
- REQD = REQUIRED
- RO = ROUGH OPENING
- SCH = SCHEDULE
- SDST = SELF-DRILLING, SELF-TAPPING
- SECT = SECTION
- SHT = SHEET
- SIM = SIMILAR
- SC = SLIP CRITICAL
- SI = SNOW LOAD
- SOG = SLAB ON GRADE
- SP(S) = SPACE(S)
- SPEC(S) = SPECIFICATION(S)
- SO = SQUARE
- SS = STAINLESS STEEL
- STD = STANDARD
- STL = STEEL
- STIFF = STIFFENER
- STRIP(S) = STRIP(S)
- STRUCT = STRUCTURAL
- SYM = SYMMETRICAL



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SPECIFICATIONS, NOTES, LEGENDS
San Antonio Housing Authority
PHASE B - Fire Protection Systems & Life Safety Renovations
Villa Tranchese Apartments
 307 Marshall Street
 San Antonio, Texas



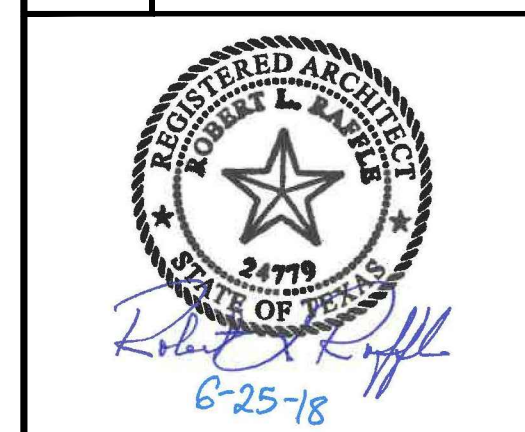
REVISIONS:

No.	DATE	DESCRIPTION
0	05-22-18	BIDDING

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PROJECT No.: ASR17-019-00
 ISSUE DATE: 05-22-18
 DRAWN BY:
 CHECKED BY:
 REVIEWED BY:

SHEET NO.
A0-B

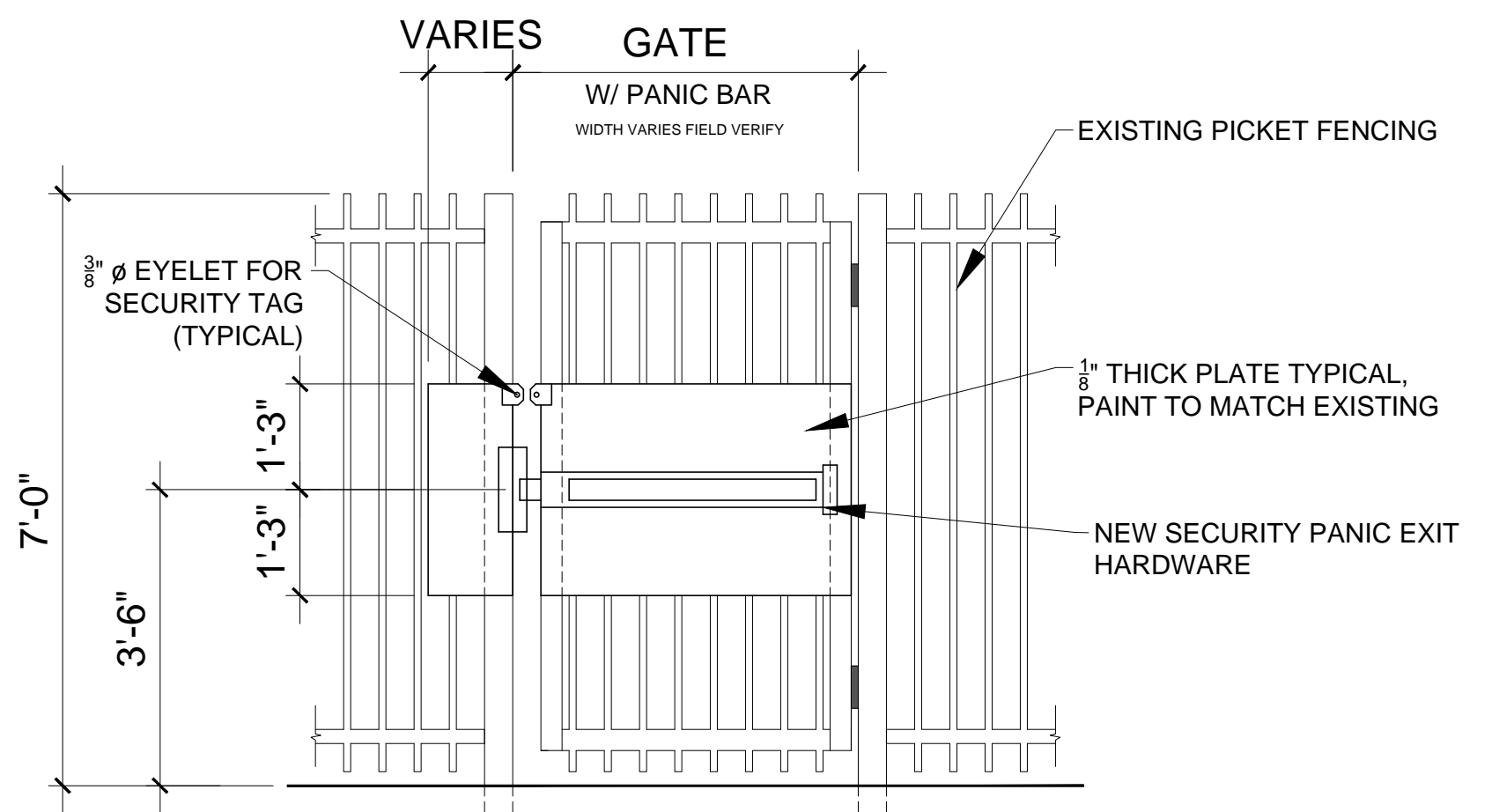
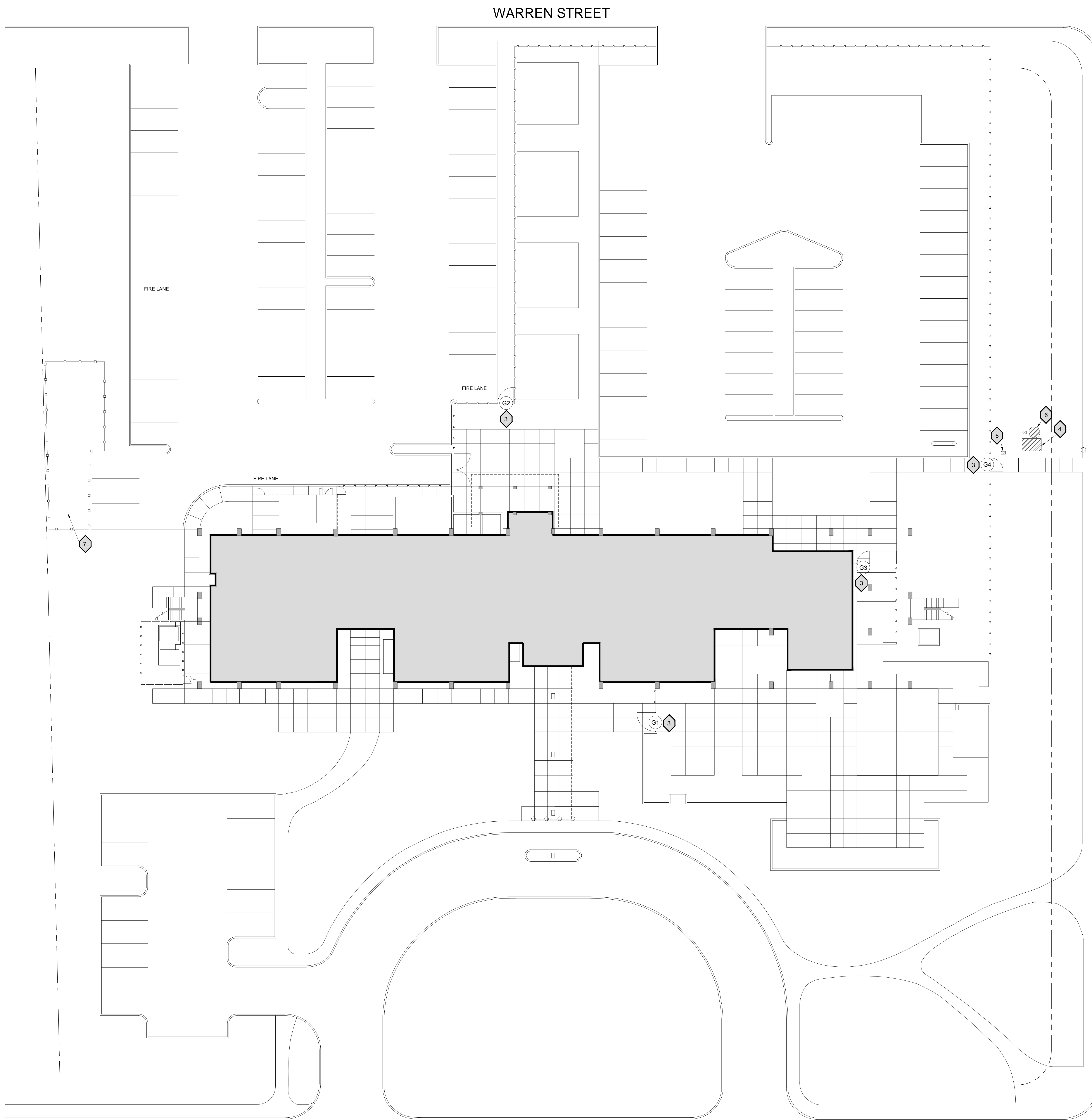


REVISIONS:

No.	DATE	DESCRIPTION
0	05-22-18	BIDDING

PROJECT No.: ASR17-019-00
 ISSUE DATE: 05-22-18
 DRAWN BY:
 CHECKED BY:
 REVIEWED BY:

SHEET NO.
A1-B



1 SECURITY GATE PANIC BAR
 SCALE: NTS

JACKSON STREET

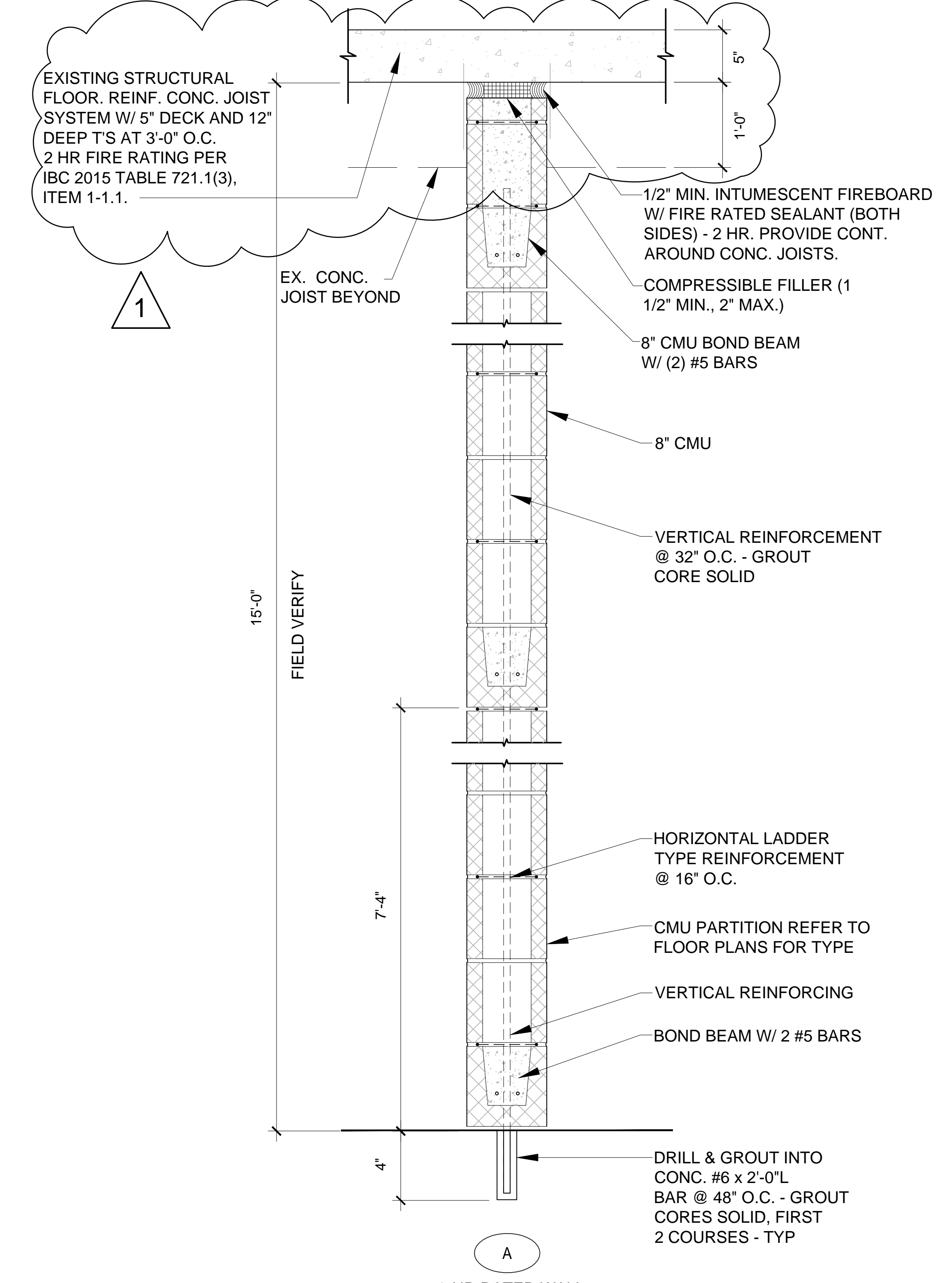
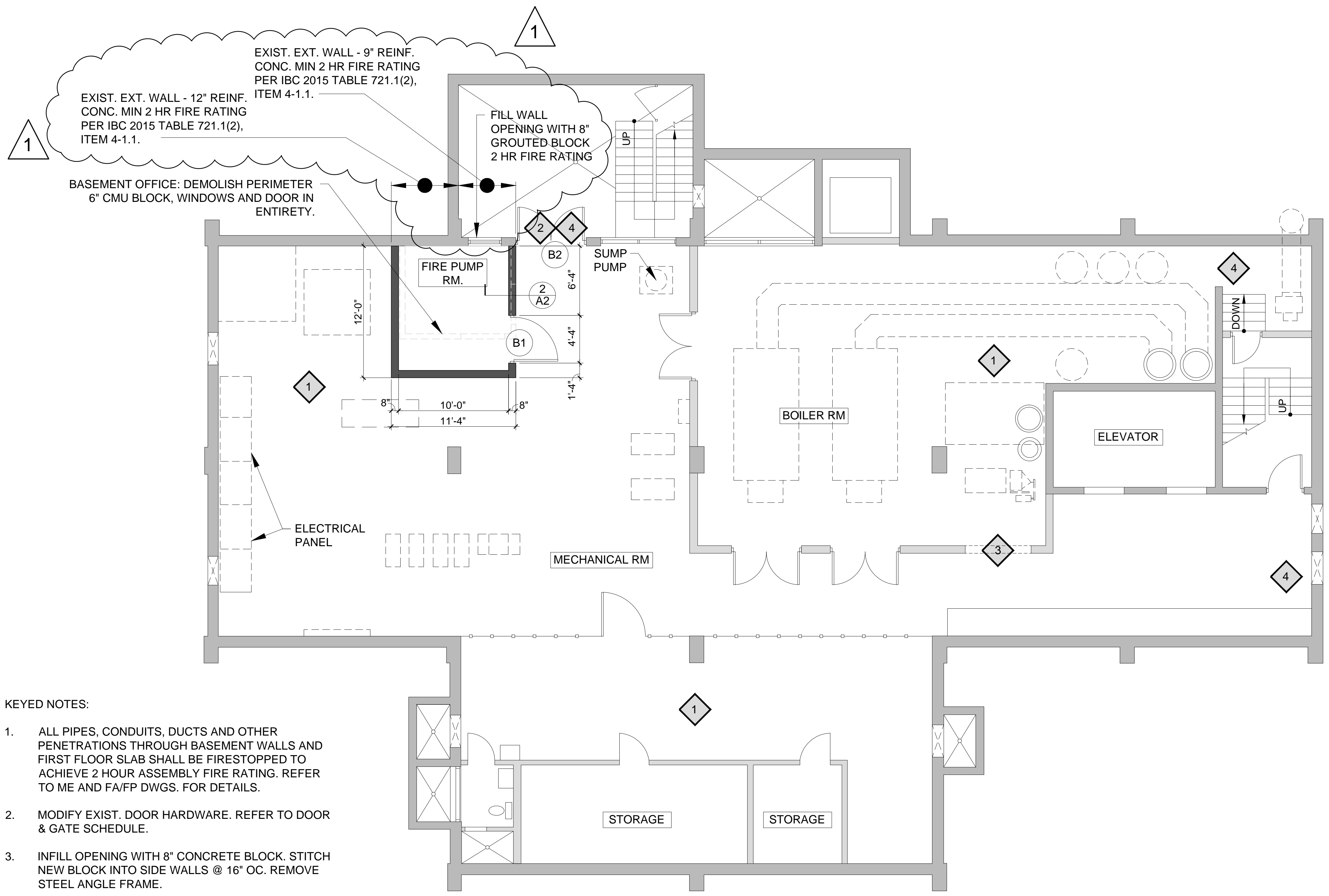
WARREN STREET

MARSHALL STREET

- KEYED NOTES:**
- NOT USED
 - NOT USED
 - REFER DOOR & GATE SCHEDULE, DWG. A2
 - EXIST. FS VAULT TO BE REPLACED, SEE DWG. FS100
 - EXIST. VALVE BOX
 - EXIST. MH
 - SEE DWG. ME-1, DTL 2 FOR GENERATOR CONCRETE PAD

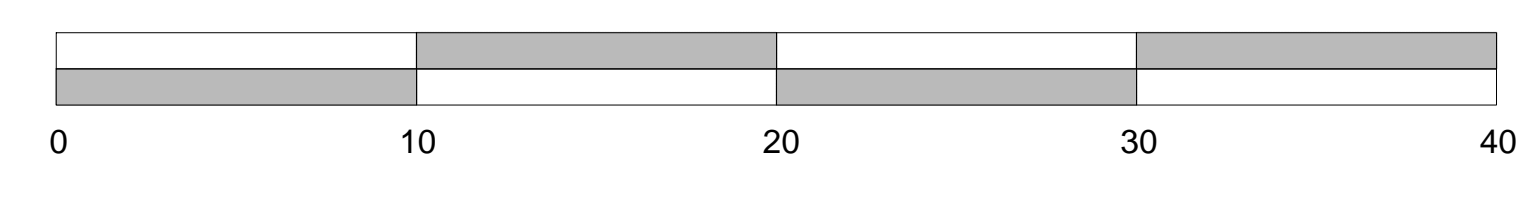
1 SITE PLAN
 SCALE: 1/16" = 1'-0"
 TRUE NORTH

M:\Projects\2017\ASR17-019-00_Villa Tranchese Apartments\Drawings\A1-B_Site Plan.rvt (RABAK)

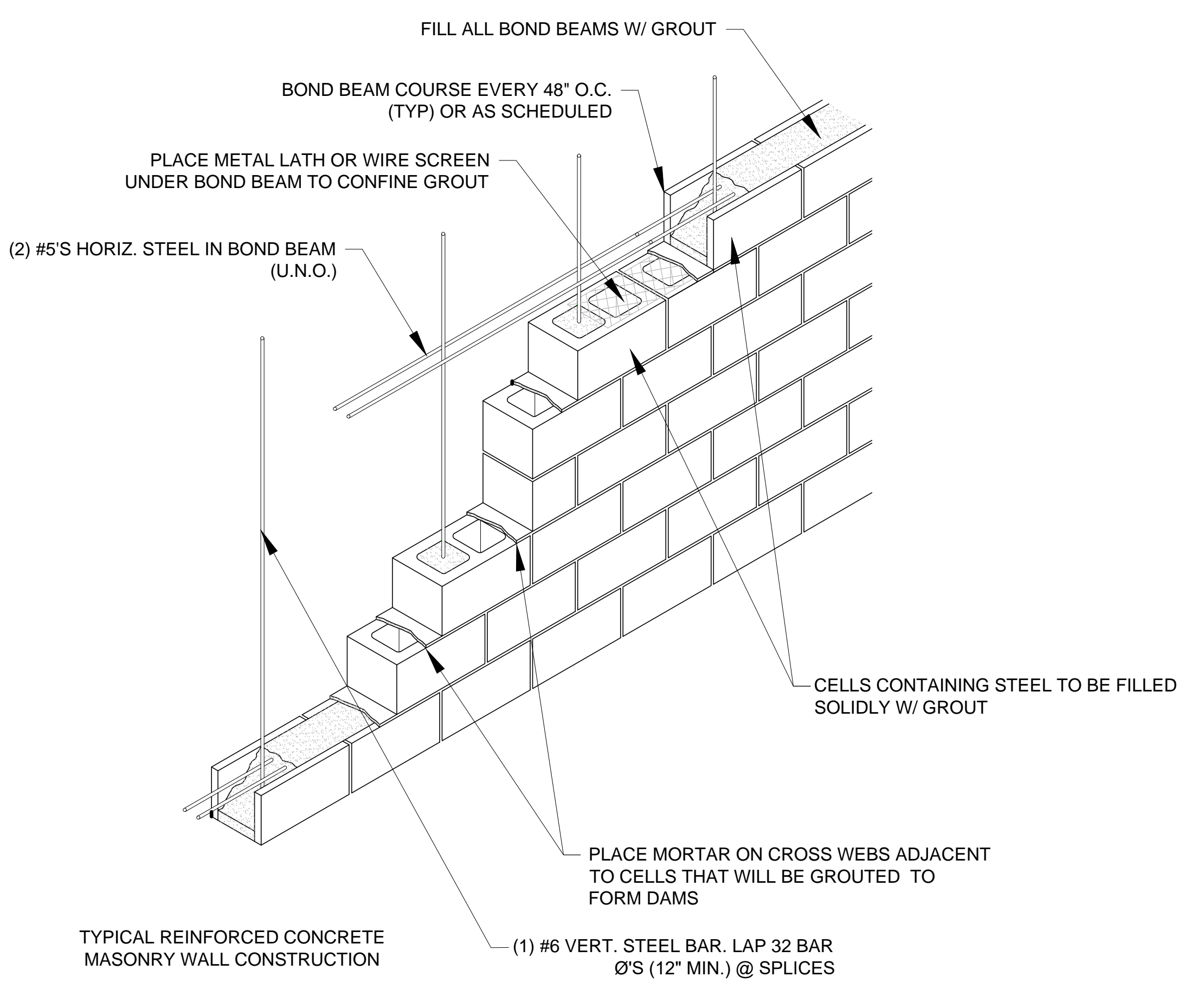


- KEYED NOTES:**
- ALL PIPES, CONDUITS, DUCTS AND OTHER PENETRATIONS THROUGH BASEMENT WALLS AND FIRST FLOOR SLAB SHALL BE FIRESTOPPED TO ACHIEVE 2 HOUR ASSEMBLY FIRE RATING. REFER TO ME AND FA/FP DWGS. FOR DETAILS.
 - MODIFY EXIST. DOOR HARDWARE. REFER TO DOOR & GATE SCHEDULE.
 - INFILL OPENING WITH 8" CONCRETE BLOCK. STITCH NEW BLOCK INTO SIDE WALLS @ 16" OC. REMOVE STEEL ANGLE FRAME.
 - PROVIDE ILLUMINATED EXIT SIGNAGE. REFER TO ME DRAWINGS.

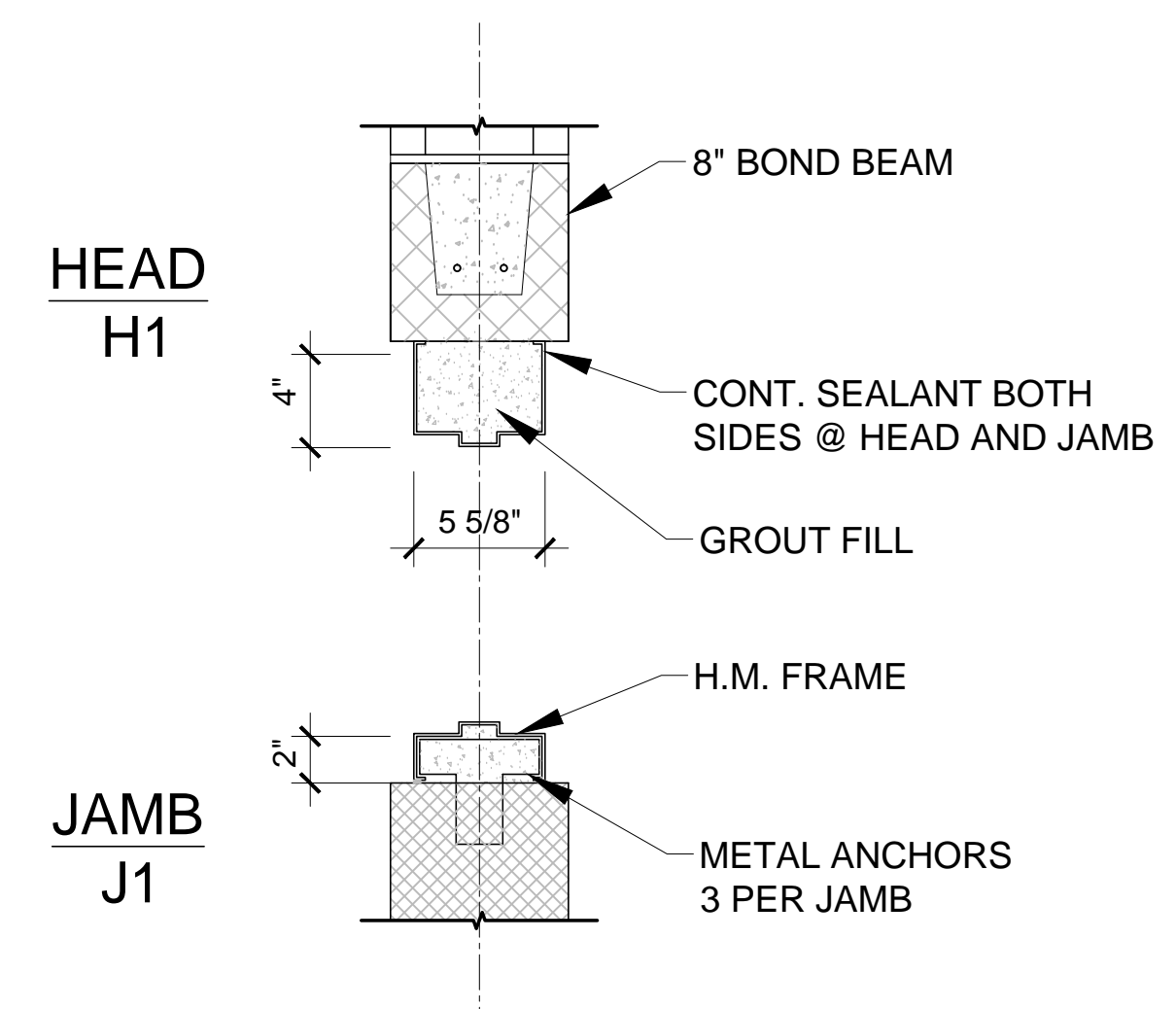
1 BASEMENT PLAN
 SCALE: 3/16" = 1'-0"



2 8" CMU WALL SECTION
 SCALE: NTS



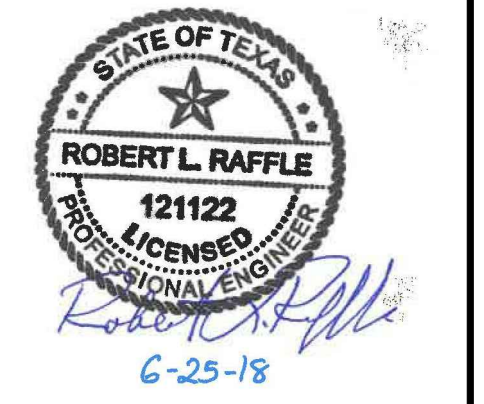
3 8" CMU WALL DETAIL
 SCALE: NTS



4 HEAD / JAMB DETAIL
 SCALE: NTS

OPENING NUMBER	FRAME					WIDTH	HEIGHT	TYPE	MATERIAL	THICKNESS	LABEL (HRS)	HARDWARE GROUP	FINISH	COMMENTS
	TYPE	MATERIAL	HEAD	JAMB	SILL									
B1	A	HM	H1	J1		4'-0"	7'-0"	1	HM	1 1/2"	2	1	PT	SOLID CORE DOOR: PRIMED FOR FIELD PAINTING
B2		EXISTING				3'-0"	PR					2		
100		EXISTING				3'-0"						3		
101		EXISTING				3'-0"						4		
102		EXISTING				3'-0"						5		
103		EXISTING				3'-0"	PR					6		
G1		EXISTING				5'-10"						7		
G2		NEW PICKET GATE				4'-0"						8	PT	REVISE SWING TO LEFT-HAND REVERSE. MATCH EXIST. STYLE & FINISH
G3		EXISTING				5'-3"						9		
G4		NEW PICKET GATE				4'-0"						10	PT	REVISE SWING TO LEFT-HAND REVERSE. MATCH EXIST. STYLE & FINISH

- HARDWARE GENERAL NOTES**
- ALL NEW HARDWARE SHALL BE HEAVY DUTY COMMERCIAL GRADE STAINLESS STEEL, SATIN FINISH.
 - HARDWARE SHALL BE SELECTED TO SUIT EXISTING CONDITIONS.
- GROUP 1**
- ENTRY LEVER & STRIKE
 - HEAVY DUTY BUTTS
 - CLOSER
 - KICK PLATES - BOTH SIDES
 - EXIT PANIC BAR
- GROUP 2**
- REMOVE LATCH BOLT HARDWARE.
 - CLOSER ON LEFT (ACTIVE) LEAF
 - EXIT PANIC BAR ON LEFT LEAF & STRIKE /LATCH ON RIGHT LEAF.
 - EXTERIOR PULL HANDLE ON ACTIVE LEAF
 - REUSE EXIST. LOCKSET IF PRACTICABLE; OTHERWISE, REPLACE W/ KEYED LOCK.
- GROUP 3**
- REMOVE PULL HANDLE FROM INSIDE ONLY.
 - CLOSER
 - REMOVE LOCK/LATCH
 - EXIT PANIC BAR
- GROUP 4**
- REMOVE PULL HANDLES FROM BOTH SIDES
 - CLOSER
 - REMOVE LOCK/LATCH
 - EXIT PANIC BAR
- GROUP 5**
- CLOSER
- GROUP 6**
- CLOSER
- GROUP 7, 9**
- EXTERIOR GRADE EXIT PANIC BAR
 - REFER DTL. 1/A1 FOR OTHER HARDWARE REQUIREMENTS
- GROUP 8 & 10**
- EXTERIOR GRADE EXIT PANIC BAR
 - REMOVE EXIST. HINGES
 - NEW HINGES WELDED TO EXIST. POSTS
 - [GROUP 8 ONLY] KEYED/LEVERED ENTRY HARDWARE. REFER DTL. 1/A1 FOR OTHER HARDWARE REQUIREMENTS



REVISIONS:

No.	DATE	DESCRIPTION
0	05-22-18	BIDDING
1	10-11-18	ADD FIRE RATINGS

PROJECT No.: ASR17-019-00
 ISSUE DATE: 05-22-18
 DRAWN BY:
 CHECKED BY:
 REVIEWED BY:

FIRST LEVEL PLAN (WEST END)
San Antonio Housing Authority
PHASE B - Fire Protection Systems & Life Safety Renovations
Villa Tranchese Apartments
 307 Marshall Street
 San Antonio, Texas

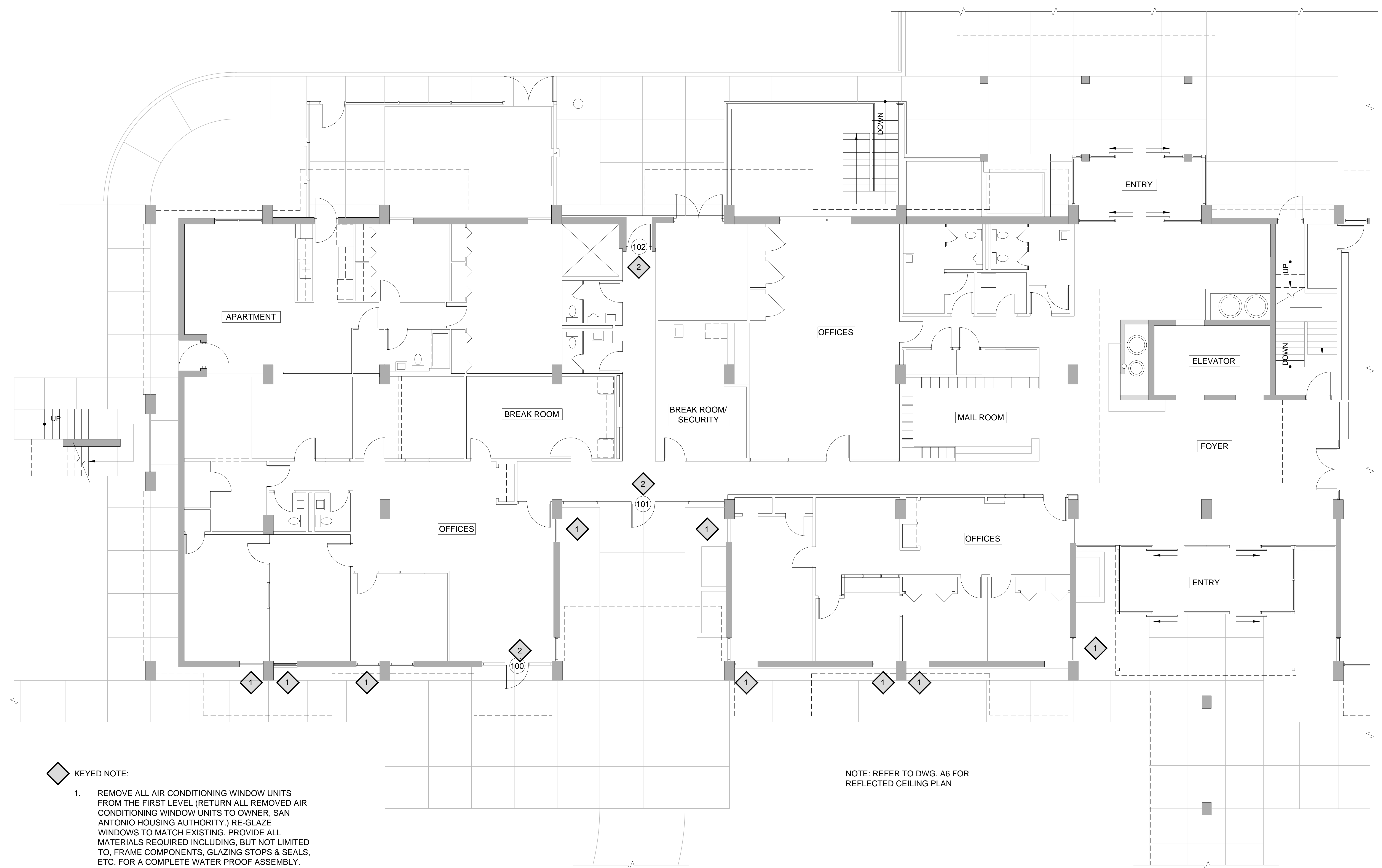


REVISIONS:

No.	DATE	DESCRIPTION
0	05-22-18	BIDDING

PROJECT No.: ASR17-019-00
 ISSUE DATE: 05-22-18
 DRAWN BY:
 CHECKED BY:
 REVIEWED BY:

SHEET NO.
A3-B



- KEYED NOTE:**
1. REMOVE ALL AIR CONDITIONING WINDOW UNITS FROM THE FIRST LEVEL (RETURN ALL REMOVED AIR CONDITIONING WINDOW UNITS TO OWNER, SAN ANTONIO HOUSING AUTHORITY.) RE-GLAZE WINDOWS TO MATCH EXISTING. PROVIDE ALL MATERIALS REQUIRED INCLUDING, BUT NOT LIMITED TO, FRAME COMPONENTS, GLAZING STOPS & SEALS, ETC. FOR A COMPLETE WATER PROOF ASSEMBLY.
 2. REFER DOOR & GATE SCHEDULE, DWG. A2.

NOTE: REFER TO DWG. A6 FOR REFLECTED CEILING PLAN

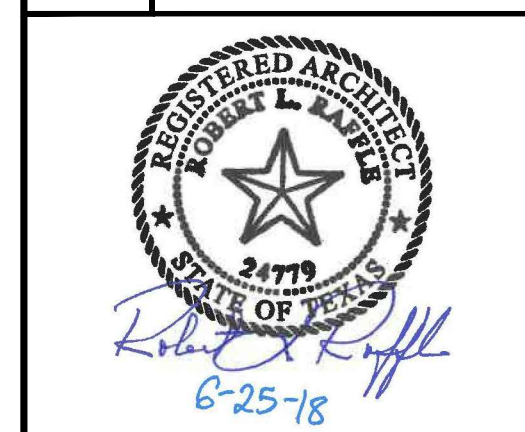
MATCHLINE REFER TO DWG. A4

1 FIRST LEVEL PLAN (WEST END)
 SCALE: 3/16" = 1'-0"

TRUE NORTH

M:\Users\Bkistner\OneDrive - Raba Kistner Consultants, Inc.\Desktop\2018\180522_Villa Tranchese Apartments - Phase B - Fire Protection Systems & Life Safety Renovations - RABA KISTNER.dwg

FIRST LEVEL PLAN (EAST END)
San Antonio Housing Authority
Phase B - Fire Protection Systems & Life Safety Renovations
Villa Tranchese Apartments
 307 Marshall Street
 San Antonio, Texas

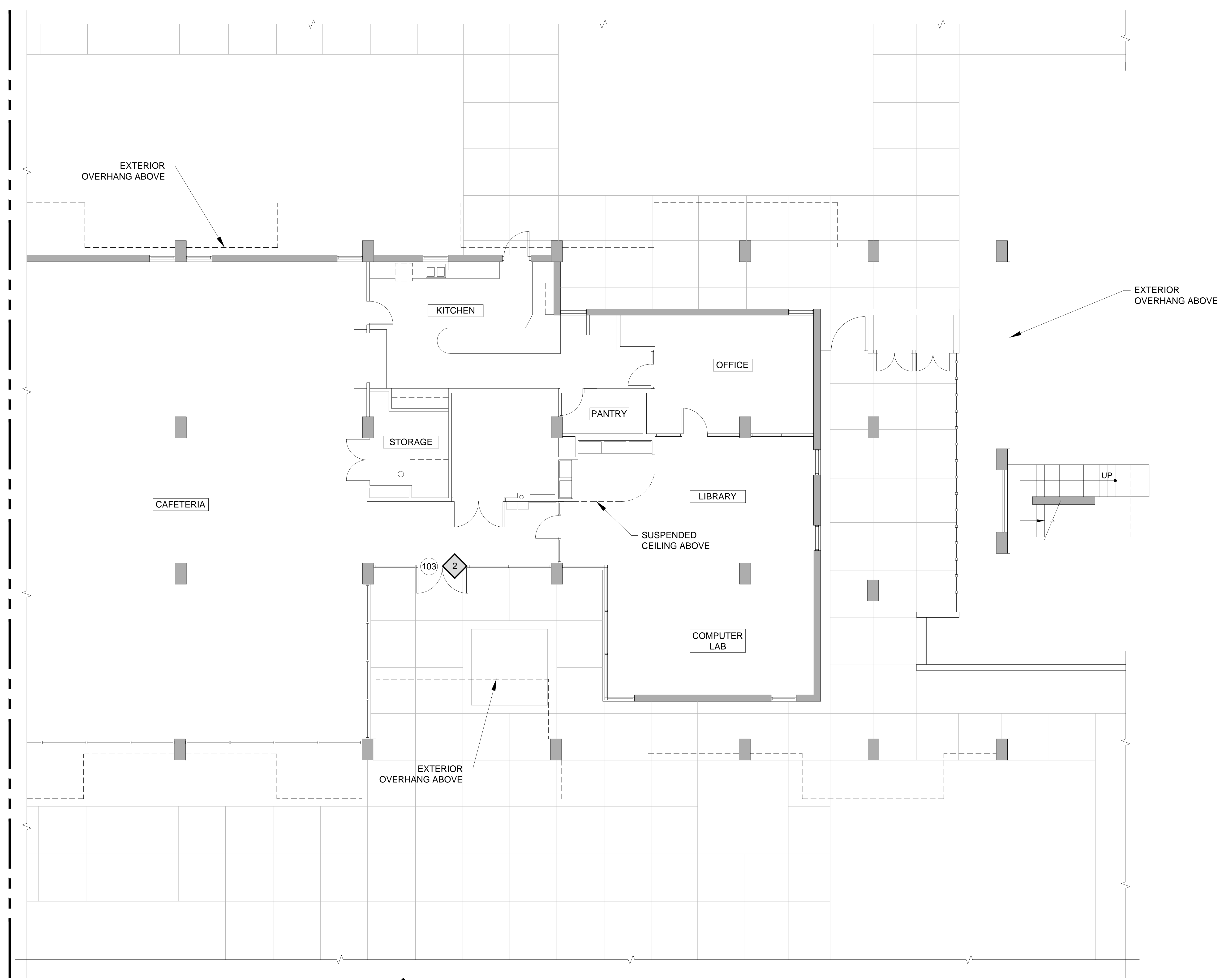


REVISIONS:

No.	DATE	DESCRIPTION
0	05-22-18	BIDDING

PROJECT No.: ASR17-019-00
 ISSUE DATE: 05-22-18
 DRAWN BY:
 CHECKED BY:
 REVIEWED BY:

SHEET NO.
A4-B

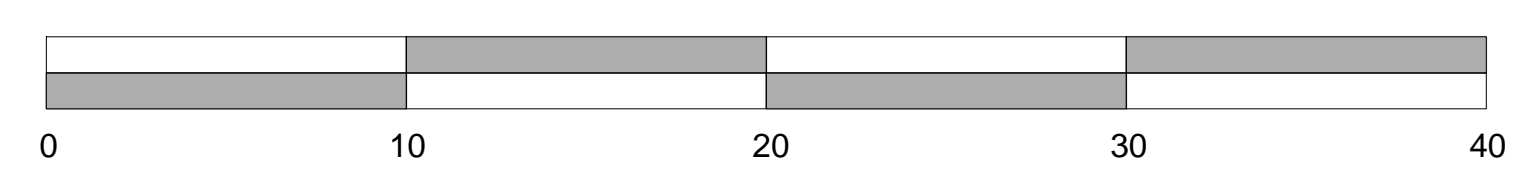


MATCHLINE
 REFER TO DWG. A3

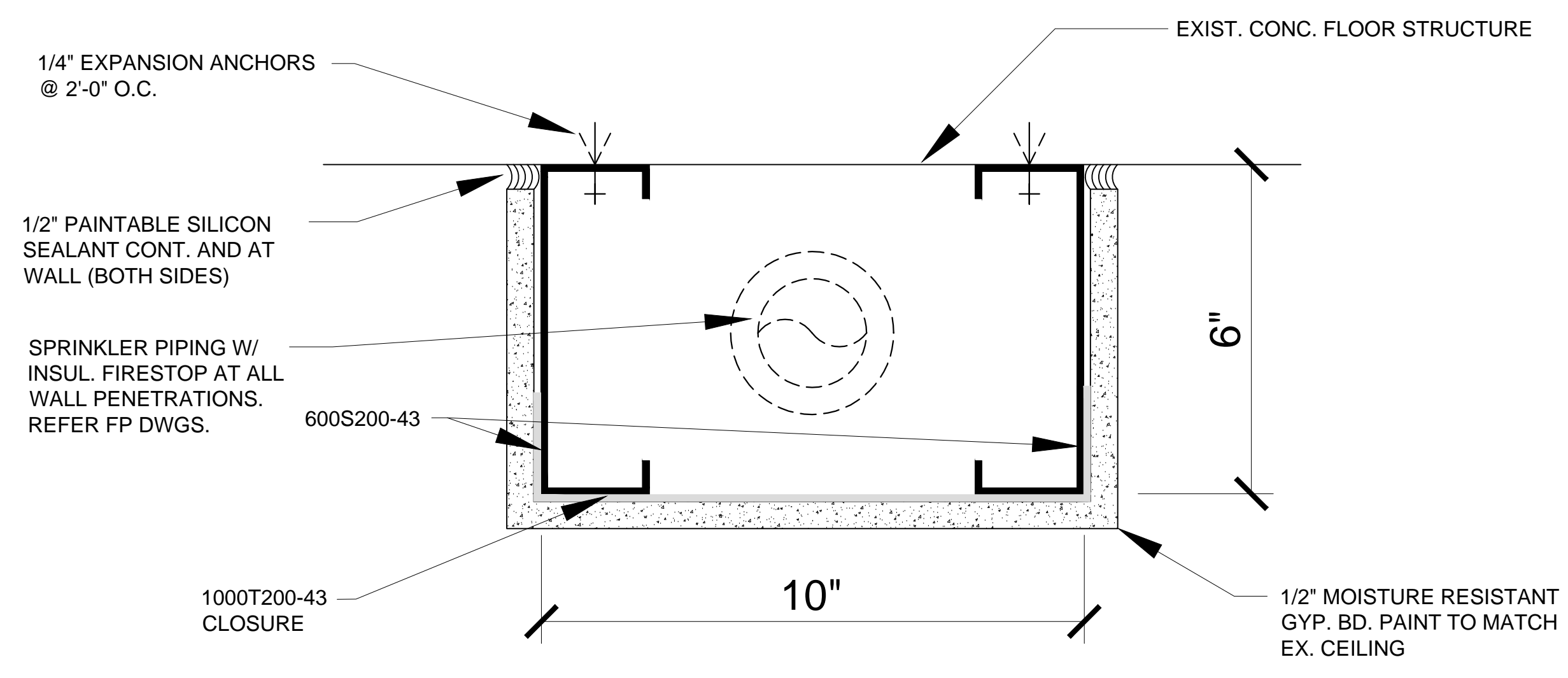
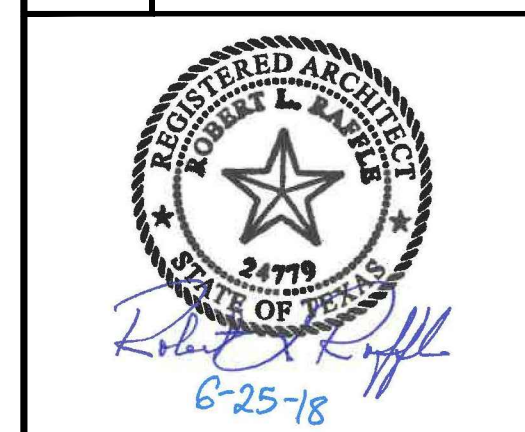
- KEYED NOTE:
- NOT USED.
 - REFER DOOR & GATE SCHEDULE, DWG. A2

NOTE: REFER TO DWG. A7 FOR REFLECTED CEILING PLAN

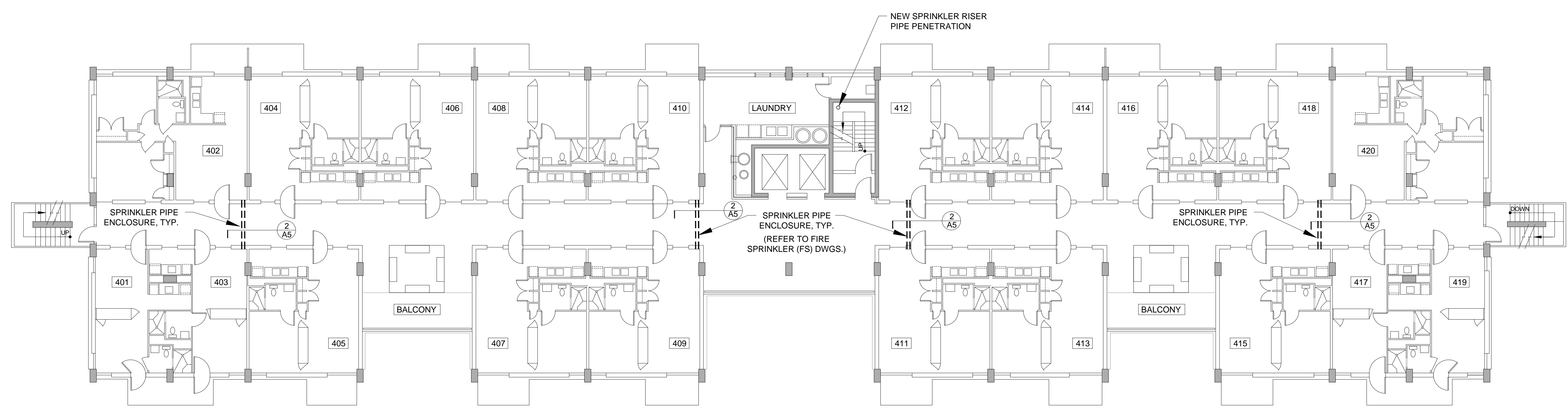
1 FIRST LEVEL PLAN (EAST END)
 SCALE: 3/16" = 1'-0"
 TRUE NORTH



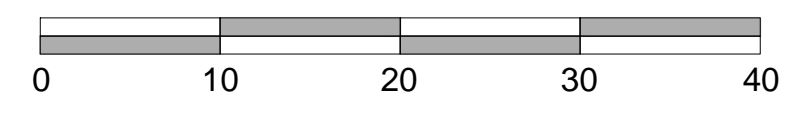
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2 SPRINKLER PIPE ENCLOSURE
 SCALE: NTS



1 TYPICAL UPPER LEVEL FLOOR PLAN
 SCALE: 3/32" = 1'-0"
 TRUE NORTH



REVISIONS:

No.	DATE	DESCRIPTION
0	05-22-18	BIDDING

PROJECT No.: ASR17-019-00
 ISSUE DATE: 05-22-18
 DRAWN BY:
 CHECKED BY:
 REVIEWED BY:

SHEET NO.
A5-B

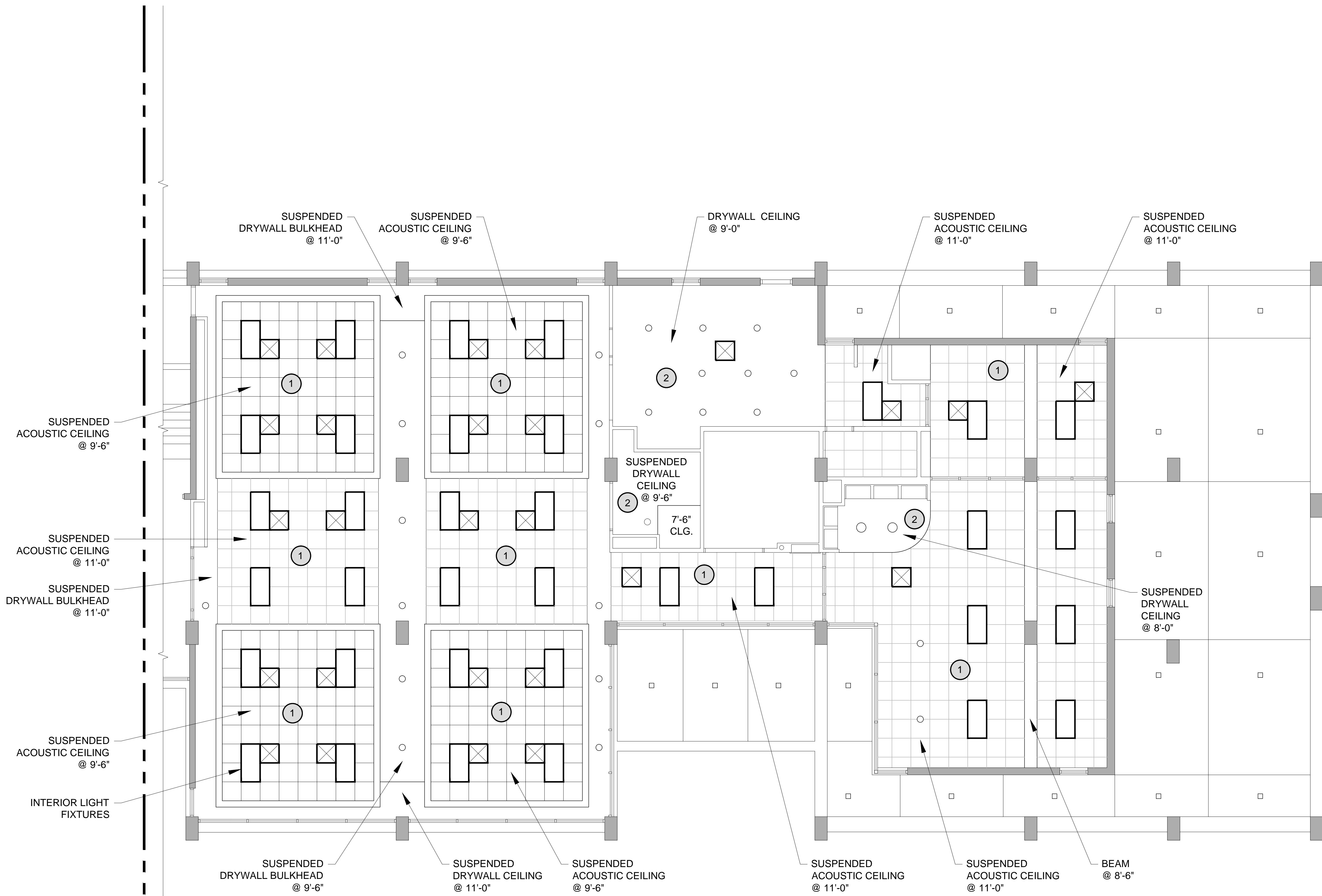


REVISIONS:

No.	DATE	DESCRIPTION
0	05-22-18	BIDDING

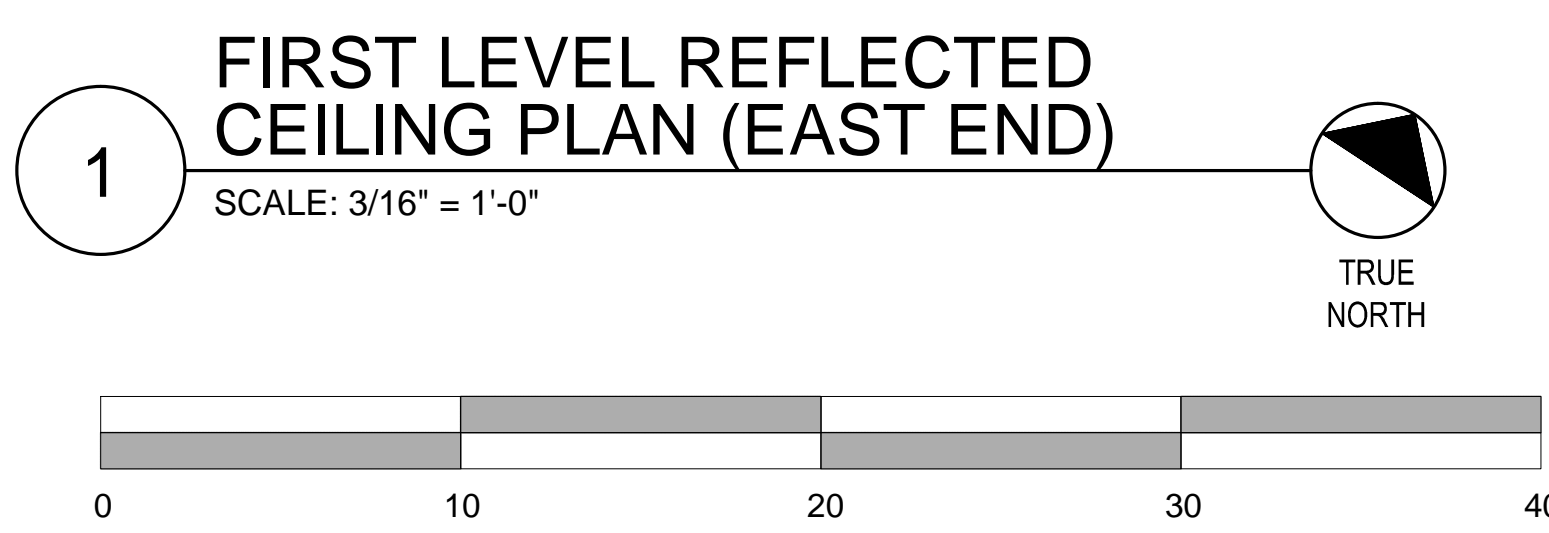
These documents and the ideas incorporated herein are instruments of professional service and are the property of Raba-Kistner Consultants, Inc. and are not to be used in whole or part without the written authorization of Raba-Kistner Consultants, Inc.

PROJECT No.: ASR17-019-00
 ISSUE DATE: 05-22-18
 DRAWN BY:
 CHECKED BY:
 REVIEWED BY:



- KEYED NOTE:
1. REMOVE AND REINSTALL CEILING TILE, GRID, LIGHT FIXTURES AND DIFFUSERS/ GRILLES AS REQUIRED FOR INSTALLATION OF FIRE ALARM DEVICES/ WIRING AND FIRE SPRINKLER SYSTEMS.
 2. REMOVE AND REINSTALL GYPSUM BOARD DRYWALL CEILING AS REQUIRED FOR INSTALLATION OF FIRE ALARM DEVICES/ WIRING AND FIRE SPRINKLER SYSTEMS.
 3. OWNER MAY ELECT TO REPLACE LAY-IN CEILING TILES AND SUSPENDED CEILING GRID SYSTEM PER UNIT PRICES WITH AN ALTERNATE DEDUCT.

- RCP LEGEND:
- EXISTING EXTERIOR LIGHT FIXTURE
 - EXISTING INTERIOR RECESSED LIGHT FIXTURE
 - EXISTING CEILING DIFFUSER
 - EXISTING 2 x 4 INTERIOR LIGHT FIXTURE
 - EXISTING 1 x 4 INTERIOR LIGHT FIXTURE
 - EXISTING 2 x 2 INTERIOR LIGHT FIXTURE



MATCHLINE REFER TO DWG. A6

ATTACHMENT B
HUD Forms and
Conflict of Interest Questionnaire
Form 1295 Certificate of Interested Parties

*(Form 1295 is to be completed online by the **Selected Respondent** and submitted to the Texas Ethics Commission pursuant to Government Code 2252.908 and a copy returned to SAHA with the Certification prior to contract execution. A copy of the 1295 Form is included herein for information purposes only).*

“Do Not complete the Form 1295 until you have been awarded a contract.”

**U.S. Department of Housing and
Urban Development**
Office of Public and Indian Housing

**Instructions to Bidders for Contracts
Public and Indian Housing Programs**

Instructions to Bidders for Contracts

Public and Indian Housing Programs

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1. Bid Preparation and Submission

(a) Bidders are expected to examine the specifications, drawings, all instructions, and, if applicable, the construction site (see also the contract clause entitled **Site Investigation and Conditions Affecting the Work** of the *General Conditions of the Contract for Construction*). Failure to do so will be at the bidders' risk.

(b) All bids must be submitted on the forms provided by the Public Housing Agency/Indian Housing Authority (PHA/IHA). Bidders shall furnish all the information required by the solicitation. Bids must be signed and the bidder's name typed or printed on the bid sheet and each continuation sheet which requires the entry of information by the bidder. Erasures or other changes must be initialed by the person signing the bid. Bids signed by an agent shall be accompanied by evidence of that agent's authority. (Bidders should retain a copy of their bid for their records.)

(c) Bidders must submit as part of their bid a completed form HUD-5369-A, "Representations, Certifications, and Other Statements of Bidders."

(d) All bid documents shall be sealed in an envelope which shall be clearly marked with the words "Bid Documents," the Invitation for Bids (IFB) number, any project or other identifying number, the bidder's name, and the date and time for receipt of bids.

(e) If this solicitation requires bidding on all items, failure to do so will disqualify the bid. If bidding on all items is not required, bidders should insert the words "No Bid" in the space provided for any item on which no price is submitted.

(f) Unless expressly authorized elsewhere in this solicitation, alternate bids will not be considered.

(g) Unless expressly authorized elsewhere in this solicitation, bids submitted by telegraph or facsimile (fax) machines will not be considered.

(h) If the proposed contract is for a Mutual Help project (as described in 24 CFR Part 905, Subpart E) that involves Mutual Help contributions of work, material, or equipment, supplemental information regarding the bid advertisement is provided as an attachment to this solicitation.

2. Explanations and Interpretations to Prospective Bidders

(a) Any prospective bidder desiring an explanation or interpretation of the solicitation, specifications, drawings, etc., must request it at least 7 days before the scheduled time for bid opening. Requests may be oral or written. Oral requests must be confirmed in writing. The only oral clarifications that will be provided will be those clearly related to solicitation procedures, i.e., not substantive technical information. No other oral explanation or interpretation will be provided. Any information given a prospective bidder concerning this solicitation will be furnished promptly to all other prospective bidders as a written amendment to the solicitation, if that information is necessary in submitting bids, or if the lack of it would be prejudicial to other prospective bidders.

(b) Any information obtained by, or provided to, a bidder other than by formal amendment to the solicitation shall not constitute a change to the solicitation.

3. Amendments to Invitations for Bids

(a) If this solicitation is amended, then all terms and conditions which are not modified remain unchanged.

(b) Bidders shall acknowledge receipt of any amendment to this solicitation (1) by signing and returning the amendment, (2) by identifying the amendment number and date on the bid form, or (3) by letter, telegram, or facsimile, if those methods are authorized in the solicitation. The PHA/IHA must receive acknowledgement by the time and at the place specified for receipt of bids. Bids which fail to acknowledge the bidder's receipt of any amendment will result in the rejection of the bid if the amendment(s) contained information which substantively changed the PHA's/IHA's requirements.

(c) Amendments will be on file in the offices of the PHA/IHA and the Architect at least 7 days before bid opening.

4. Responsibility of Prospective Contractor

(a) The PHA/IHA will award contracts only to responsible prospective contractors who have the ability to perform successfully under the terms and conditions of the proposed contract. In determining the responsibility of a bidder, the PHA/IHA will consider such matters as the bidder's:

- (1) Integrity;
- (2) Compliance with public policy;
- (3) Record of past performance; and
- (4) Financial and technical resources (including construction and technical equipment).

(b) Before a bid is considered for award, the bidder may be requested by the PHA/IHA to submit a statement or other documentation regarding any of the items in paragraph (a) above. Failure by the bidder to provide such additional information shall render the bidder nonresponsible and ineligible for award.

5. Late Submissions, Modifications, and Withdrawal of Bids

(a) Any bid received at the place designated in the solicitation after the exact time specified for receipt will not be considered unless it is received before award is made and it:

(1) Was sent by registered or certified mail not later than the fifth calendar day before the date specified for receipt of offers (e.g., an offer submitted in response to a solicitation requiring receipt of offers by the 20th of the month must have been mailed by the 15th);

(2) Was sent by mail, or if authorized by the solicitation, was sent by telegram or via facsimile, and it is determined by the PHA/IHA that the late receipt was due solely to mishandling by the PHA/IHA after receipt at the PHA/IHA; or

(3) Was sent by U.S. Postal Service Express Mail Next Day Service - Post Office to Addressee, not later than 5:00 p.m. at the place of mailing two working days prior to the date specified for receipt of proposals. The term "working days" excludes weekends and observed holidays.

(b) Any modification or withdrawal of a bid is subject to the same conditions as in paragraph (a) of this provision.

(c) The only acceptable evidence to establish the date of mailing of a late bid, modification, or withdrawal sent either by registered or certified mail is the U.S. or Canadian Postal Service postmark both on the envelope or wrapper and on the original receipt from the U.S. or Canadian Postal Service. Both postmarks must show a legible date or the bid, modification, or withdrawal shall be processed as if mailed late. "Postmark" means a printed, stamped, or otherwise placed impression (exclusive of a postage meter machine impression) that is readily identifiable without further action as having been supplied and affixed by employees of the U.S. or Canadian Postal Service on the date of mailing. Therefore, bidders should request the postal clerk to place a hand cancellation bull's-eye postmark on both the receipt and the envelope or wrapper.

(d) The only acceptable evidence to establish the time of receipt at the PHA/IHA is the time/date stamp of PHA/IHA on the proposal wrapper or other documentary evidence of receipt maintained by the PHA/IHA.

(e) The only acceptable evidence to establish the date of mailing of a late bid, modification, or withdrawal sent by Express Mail Next Day Service-Post Office to Addressee is the date entered by the post office receiving clerk on the "Express Mail Next Day Service-Post Office to Addressee" label and the postmark on both the envelope or wrapper and on the original receipt from the U.S. Postal Service. "Postmark" has the same meaning as defined in paragraph (c) of this provision, excluding postmarks of the Canadian Postal Service. Therefore, bidders should request the postal clerk to place a legible hand cancellation bull's eye postmark on both the receipt and Failure by a bidder to acknowledge receipt of the envelope or wrapper.

(f) Notwithstanding paragraph (a) of this provision, a late modification of an otherwise successful bid that makes its terms more favorable to the PHA/IHA will be considered at any time it is received and may be accepted.

(g) Bids may be withdrawn by written notice, or if authorized by this solicitation, by telegram (including mailgram) or facsimile machine transmission received at any time before the exact time set for opening of bids; provided that written confirmation of telegraphic or facsimile withdrawals over the signature of the bidder is mailed and postmarked prior to the specified bid opening time. A bid may be withdrawn in person by a bidder or its authorized representative if, before the exact time set for opening of bids, the identity of the person requesting withdrawal is established and the person signs a receipt for the bid.

6. Bid Opening

All bids received by the date and time of receipt specified in the solicitation will be publicly opened and read. The time and place of opening will be as specified in the solicitation. Bidders and other interested persons may be present.

7. Service of Protest

(a) Definitions. As used in this provision:

"Interested party" means an actual or prospective bidder whose direct economic interest would be affected by the award of the contract.

"Protest" means a written objection by an interested party to this solicitation or to a proposed or actual award of a contract pursuant to this solicitation.

(b) Protests shall be served on the Contracting Officer by obtaining written and dated acknowledgement from —

Director Of Procurement
San Antonio Housing Authority
818 S. Flores
San Antonio, TX 78204

[Contracting Officer designate the official or location where a protest may be served on the Contracting Officer]

(c) All protests shall be resolved in accordance with the PHA's/IHA's protest policy and procedures, copies of which are maintained at the PHA/IHA.

8. Contract Award

(a) The PHA/IHA will evaluate bids in response to this solicitation without discussions and will award a contract to the responsible bidder whose bid, conforming to the solicitation, will be most advantageous to the PHA/IHA considering only price and any price-related factors specified in the solicitation.

(b) If the apparent low bid received in response to this solicitation exceeds the PHA's/IHA's available funding for the proposed contract work, the PHA/IHA may either accept separately priced items (see 8(e) below) or use the following procedure to determine contract award. The PHA/IHA shall apply in turn to each bid (proceeding in order from the apparent low bid to the high bid) each of the separately priced bid deductible items, if any, in their priority order set forth in this solicitation. If upon the application of the first deductible item to all initial bids, a new low bid is within the PHA's/IHA's available funding, then award shall be made to that bidder. If no bid is within the available funding amount, then the PHA/IHA shall apply the second deductible item. The PHA/IHA shall continue this process until an evaluated low bid, if any, is within the PHA's/IHA's available funding. If upon the application of all deductibles, no bid is within the PHA's/IHA's available funding, or if the solicitation does not request separately priced deductibles, the PHA/IHA shall follow its written policy and procedures in making any award under this solicitation.

(c) In the case of tie low bids, award shall be made in accordance with the PHA's/IHA's written policy and procedures.

(d) The PHA/IHA may reject any and all bids, accept other than the lowest bid (e.g., the apparent low bid is unreasonably low), and waive informalities or minor irregularities in bids received, in accordance with the PHA's/IHA's written policy and procedures.

(e) Unless precluded elsewhere in the solicitation, the PHA/IHA may accept any item or combination of items bid.

(f) The PHA/IHA may reject any bid as nonresponsive if it is materially unbalanced as to the prices for the various items of work to be performed. A bid is materially unbalanced when it is based on prices significantly less than cost for some work and prices which are significantly overstated for other work.

(g) A written award shall be furnished to the successful bidder within the period for acceptance specified in the bid and shall result in a binding contract without further action by either party.

9. Bid Guarantee (applicable to construction and equipment contracts exceeding \$25,000)

All bids must be accompanied by a negotiable bid guarantee which shall not be less than five percent (5%) of the amount of the bid. The bid guarantee may be a certified check, bank draft, U.S. Government Bonds at par value, or a bid bond secured by a surety company acceptable to the U.S. Government and authorized to do business in the state where the work is to be performed. In the case where the work under the contract will be performed on an Indian reservation area, the bid guarantee may also be an irrevocable Letter of Credit (see provision 10, Assurance of Completion, below). Certified checks and bank drafts must be made payable to the order of the PHA/IHA. The bid guarantee shall insure the execution of the contract and the furnishing of a method of assurance of completion by the successful bidder as required by the solicitation. Failure to submit a bid guarantee with the bid shall result in the rejection of the bid. Bid guarantees submitted by unsuccessful bidders will be returned as soon as practicable after bid opening.

10. Assurance of Completion

(a) Unless otherwise provided in State law, the successful bidder shall furnish an assurance of completion prior to the execution of any contract under this solicitation. This assurance may be [Contracting Officer check applicable items] —

(1) a performance and payment bond in a penal sum of 100 percent of the contract price; or, as may be required or permitted by State law;

(2) separate performance and payment bonds, each for 50 percent or more of the contract price;

(3) a 20 percent cash escrow;

(4) a 25 percent irrevocable letter of credit; or,

(5) an irrevocable letter of credit for 10 percent of the total contract price with a monitoring and disbursements agreement with the IHA (applicable only to contracts awarded by an IHA under the Indian Housing Program).

(b) Bonds must be obtained from guarantee or surety companies acceptable to the U.S. Government and authorized to do business in the state where the work is to be performed. Individual sureties will not be considered. U.S. Treasury Circular Number 570, published annually in the Federal Register, lists companies approved to act as sureties on bonds securing Government contracts, the maximum underwriting limits on each contract bonded, and the States in which the company is licensed to do business. Use of companies listed in this circular is mandatory. Copies of the circular may be downloaded on the U.S. Department of Treasury website <http://www.fms.treas.gov/c570/index.html>, or ordered for a minimum fee by contacting the Government Printing Office at (202) 512-2168.

(c) Each bond shall clearly state the rate of premium and the total amount of premium charged. The current power of attorney for the person who signs for the surety company must be attached to the bond. The effective date of the power of attorney shall not precede the date of the bond. The effective date of the bond shall be on or after the execution date of the contract.

(d) Failure by the successful bidder to obtain the required assurance of completion within the time specified, or within such extended period as the PHA/IHA may grant based upon reasons determined adequate by the PHA/IHA, shall render the bidder ineligible for award. The PHA/IHA may then either award the contract to the next lowest responsible bidder or solicit new bids. The PHA/IHA may retain the ineligible bidder's bid guarantee.

11. Preconstruction Conference (applicable to construction contracts)

After award of a contract under this solicitation and prior to the start of work, the successful bidder will be required to attend a preconstruction conference with representatives of the PHA/IHA and its architect/engineer, and other interested parties convened by the PHA/IHA. The conference will serve to acquaint the participants with the general plan of the construction operation and all other requirements of the contract (e.g., Equal Employment Opportunity, Labor Standards). The PHA/IHA will provide the successful bidder with the date, time, and place of the conference.

12. Indian Preference Requirements (applicable only if this solicitation is for a contract to be performed on a project for an Indian Housing Authority)

(a) HUD has determined that the contract awarded under this solicitation is subject to the requirements of section 7(b) of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450e(b)). Section 7(b) requires that any contract or subcontract entered into for the benefit of Indians shall require that, to the greatest extent feasible

(1) Preferences and opportunities for training and employment (other than core crew positions; see paragraph (h) below) in connection with the administration of such contracts or subcontracts be given to qualified "Indians." The Act defines "Indians" to mean persons who are members of an Indian tribe and defines "Indian tribe" to mean any Indian tribe, band, nation, or other organized group or community, including any Alaska Native village or regional or village corporation as defined in or established pursuant to the Alaska Native Claims Settlement Act, which is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians; and,

(2) Preference in the award of contracts or subcontracts in connection with the administration of contracts be given to Indian organizations and to Indian-owned economic enterprises, as defined in section 3 of the Indian Financing Act of 1974 (25 U.S.C. 1452). That Act defines "economic enterprise" to mean any Indian-owned commercial, industrial, or business activity established or organized for the purpose of profit, except that the Indian ownership must constitute not less than 51 percent of the enterprise; "Indian organization" to mean the governing body of any Indian tribe or entity established or recognized by such governing body; "Indian" to mean any person who is a member of any tribe, band, group, pueblo, or community which is recognized by the Federal Government as eligible for services from the Bureau of Indian Affairs and any "Native" as defined in the Alaska Native Claims Settlement Act; and Indian "tribe" to mean any Indian tribe, band, group, pueblo, or community including Native villages and Native groups (including

corporations organized by Kenai, Juneau, Sitka, and Kodiak) as defined in the Alaska Native Claims Settlement Act, which is recognized by the Federal Government as eligible for services from the Bureau of Indian Affairs.

(b) (1) The successful Contractor under this solicitation shall comply with the requirements of this provision in awarding all subcontracts under the contract and in providing training and employment opportunities.

(2) A finding by the IHA that the contractor, either (i) awarded a subcontract without using the procedure required by the IHA, (ii) falsely represented that subcontracts would be awarded to Indian enterprises or organizations; or, (iii) failed to comply with the contractor's employment and training preference bid statement shall be grounds for termination of the contract or for the assessment of penalties or other remedies.

(c) If specified elsewhere in this solicitation, the IHA may restrict the solicitation to qualified Indian-owned enterprises and Indian organizations. If two or more (or a greater number as specified elsewhere in the solicitation) qualified Indian-owned enterprises or organizations submit responsive bids, award shall be made to the qualified enterprise or organization with the lowest responsive bid. If fewer than the minimum required number of qualified Indian-owned enterprises or organizations submit responsive bids, the IHA shall reject all bids and readvertise the solicitation in accordance with paragraph (d) below.

(d) If the IHA prefers not to restrict the solicitation as described in paragraph (c) above, or if after having restricted a solicitation an insufficient number of qualified Indian enterprises or organizations submit bids, the IHA may advertise for bids from non-Indian as well as Indian-owned enterprises and Indian organizations. Award shall be made to the qualified Indian enterprise or organization with the lowest responsive bid if that bid is -

(1) Within the maximum HUD-approved budget amount established for the specific project or activity for which bids are being solicited; and

(2) No more than the percentage specified in 24 CFR 905.175(c) higher than the total bid price of the lowest responsive bid from any qualified bidder. If no responsive bid by a qualified Indian-owned economic enterprise or organization is within the stated range of the total bid price of the lowest responsive bid from any qualified enterprise, award shall be made to the bidder with the lowest bid.

(e) Bidders seeking to qualify for preference in contracting or subcontracting shall submit proof of Indian ownership with their bids. Proof of Indian ownership shall include but not be limited to:

(1) Certification by a tribe or other evidence that the bidder is an Indian. The IHA shall accept the certification of a tribe that an individual is a member.

(2) Evidence such as stock ownership, structure, management, control, financing and salary or profit sharing arrangements of the enterprise.

(f) (1) All bidders must submit with their bids a statement describing how they will provide Indian preference in the award of subcontracts. The specific requirements of that statement and the factors to be used by the IHA in determining the statement's adequacy are included as an attachment to this solicitation. Any bid that fails to include the required statement shall be rejected as nonresponsive. The IHA may require that comparable statements be provided by subcontractors to the successful Contractor, and may require the Contractor to reject any bid or proposal by a subcontractor that fails to include the statement.

(2) Bidders and prospective subcontractors shall submit a certification (supported by credible evidence) to the IHA in any instance where the bidder or subcontractor believes it is infeasible to provide Indian preference in subcontracting. The acceptance or rejection by the IHA of the certification shall be final. Rejection shall disqualify the bid from further consideration.

(g) All bidders must submit with their bids a statement detailing their employment and training opportunities and their plans to provide preference to Indians in implementing the contract; and the number or percentage of Indians anticipated to be employed and trained. Comparable statements from all proposed subcontractors must be submitted. The criteria to be used by the IHA in determining the statement(s)'s adequacy are included as an attachment to this solicitation. Any bid that fails to include the required statement(s), or that includes a statement that does not meet minimum standards required by the IHA shall be rejected as nonresponsive.

(h) Core crew employees. A core crew employee is an individual who is a bona fide employee of the contractor at the time the bid is submitted; or an individual who was not employed by the bidder at the time the bid was submitted, but who is regularly employed by the bidder in a supervisory or other key skilled position when work is available. Bidders shall submit with their bids a list of all core crew employees.

(i) Preference in contracting, subcontracting, employment, and training shall apply not only on-site, on the reservation, or within the IHA's jurisdiction, but also to contracts with firms that operate outside these areas (e.g., employment in modular or manufactured housing construction facilities).

(j) Bidders should contact the IHA to determine if any additional local preference requirements are applicable to this solicitation.

(k) The IHA [] does [] does not [Contracting Officer check applicable box] maintain lists of Indian-owned economic enterprises and Indian organizations by specialty (e.g., plumbing, electrical, foundations), which are available to bidders to assist them in meeting their responsibility to provide preference in connection with the administration of contracts and subcontracts.

General Conditions for Construction Contracts - Public Housing Programs

U.S. Department of Housing and Urban Development
Office of Public and Indian Housing
OMB Approval No. 2577-0157 (exp. 3/31/2020)

Applicability. This form is applicable to any construction/development contract greater than \$150,000.

This form includes those clauses required by OMB's common rule on grantee procurement, implemented at HUD in 2 CFR 200, and those requirements set forth in Section 3 of the Housing and Urban Development Act of 1968 and its amendment by the Housing and Community Development Act of 1992, implemented by HUD at 24 CFR Part 135. The form is required for construction contracts awarded by Public Housing Agencies (PHAs).

The form is used by Housing Authorities in solicitations to provide necessary contract clauses. If the form were not used, HAs would be unable to enforce their contracts.

Public reporting burden for this collection of information is estimated to average 1.0 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Responses to the collection of information are required to obtain a benefit or to retain a benefit.

The information requested does not lend itself to confidentiality.

HUD may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB number.

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1. Definitions

- (a) "Architect" means the person or other entity engaged by the PHA to perform architectural, engineering, design, and other services related to the work as provided for in the contract. When a PHA uses an engineer to act in this capacity, the terms "architect" and "engineer" shall be synonymous. The Architect shall serve as a technical representative of the Contracting Officer. The Architect's authority is as set forth elsewhere in this contract.
 - (b) "Contract" means the contract entered into between the PHA and the Contractor. It includes the forms of Bid, the Bid Bond, the Performance and Payment Bond or Bonds or other assurance of completion, the Certifications, Representations, and Other Statements of Bidders (form HUD-5370), these General Conditions of the Contract for Construction (form HUD-5370), the applicable wage rate determinations from the U.S. Department of Labor, any special conditions included elsewhere in the contract, the specifications, and drawings. It includes all formal changes to any of those documents by addendum, change order, or other modification.
 - (c) "Contracting Officer" means the person delegated the authority by the PHA to enter into, administer, and/or terminate this contract and designated as such in writing to the Contractor. The term includes any successor Contracting Officer and any duly authorized representative of the Contracting Officer also designated in writing. The Contracting Officer shall be deemed the authorized agent of the PHA in all dealings with the Contractor.
 - (d) "Contractor" means the person or other entity entering into the contract with the PHA to perform all of the work required under the contract.
 - (e) "Drawings" means the drawings enumerated in the schedule of drawings contained in the Specifications and as described in the contract clause entitled Specifications and Drawings for Construction herein.
 - (f) "HUD" means the United States of America acting through the Department of Housing and Urban Development including the Secretary, or any other person designated to act on its behalf. HUD has agreed, subject to the provisions of an Annual Contributions Contract (ACC), to provide financial assistance to the PHA, which includes assistance in financing the work to be performed under this contract. As defined elsewhere in these General Conditions or the contract documents, the determination of HUD may be required to authorize changes in the work or for release of funds to the PHA for payment to the Contractor. Notwithstanding HUD's role, nothing in this contract shall be construed to create any contractual relationship between the Contractor and HUD.
 - (g) "Project" means the entire project, whether construction or rehabilitation, the work for which is provided for in whole or in part under this contract.
 - (h) "PHA" means the Public Housing Agency organized under applicable state laws which is a party to this contract.
 - (j) "Specifications" means the written description of the technical requirements for construction and includes the criteria and tests for determining whether the requirements are met.
 - (l) "Work" means materials, workmanship, and manufacture and fabrication of components.
- (a) The Contractor shall furnish all necessary labor, materials, tools, equipment, and transportation necessary for performance of the work. The Contractor shall also furnish all necessary water, heat, light, and power not made available to the Contractor by the PHA pursuant to the clause entitled Availability and Use of Utility Services herein.
 - (b) The Contractor shall perform on the site, and with its own organization, work equivalent to at least [] (12 percent unless otherwise indicated) of the total amount of work to be performed under the order. This percentage may be reduced by a supplemental agreement to this order if, during performing the work, the Contractor requests a reduction and the Contracting Officer determines that the reduction would be to the advantage of the PHA.
 - (c) At all times during performance of this contract and until the work is completed and accepted, the Contractor shall directly superintend the work or assign and have on the work site a competent superintendent who is satisfactory to the Contracting Officer and has authority to act for the Contractor.
 - (d) The Contractor shall be responsible for all damages to persons or property that occur as a result of the Contractor's fault or negligence, and shall take proper safety and health precautions to protect the work, the workers, the public, and the property of others. The Contractor shall hold and save the PHA, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance. The Contractor shall also be responsible for all materials delivered and work performed until completion and acceptance of the entire work, except for any completed unit of work which may have been accepted under the contract.
 - (e) The Contractor shall lay out the work from base lines and bench marks indicated on the drawings and be responsible for all lines, levels, and measurements of all work executed under the contract. The Contractor shall verify the figures before laying out the work and will be held responsible for any error resulting from its failure to do so.
 - (f) The Contractor shall confine all operations (including storage of materials) on PHA premises to areas authorized or approved by the Contracting Officer.
 - (g) The Contractor shall at all times keep the work area, including storage areas, free from accumulations of waste materials. After completing the work and before final inspection, the Contractor shall (1) remove from the premises all scaffolding, equipment, tools, and materials (including rejected materials) that are not the property of the PHA and all rubbish caused by its work; (2) leave the work area in a clean, neat, and orderly condition satisfactory to the Contracting Officer; (3) perform all specified tests; and, (4) deliver the installation in complete and operating condition.
 - (h) The Contractor's responsibility will terminate when all work has been completed, the final inspection made, and the work accepted by the Contracting Officer. The Contractor will then be released from further obligation except as required by the warranties specified elsewhere in the contract.

3. Architect's Duties, Responsibilities, and Authority

- (a) The Architect for this contract, and any successor, shall be designated in writing by the Contracting Officer.

2. Contractor's Responsibility for Work

- (b) The Architect shall serve as the Contracting Officer's technical representative with respect to architectural, engineering, and design matters related to the work performed under the contract. The Architect may provide direction on contract performance. Such direction shall be within the scope of the contract and may not be of a nature which: (1) institutes additional work outside the scope of the contract; (2) constitutes a change as defined in the Changes clause herein; (3) causes an increase or decrease in the cost of the contract; (4) alters the Construction Progress Schedule; or (5) changes any of the other express terms or conditions of the contract.
- (c) The Architect's duties and responsibilities may include but shall not be limited to:
- (1) Making periodic visits to the work site, and on the basis of his/her on-site inspections, issuing written reports to the PHA which shall include all observed deficiencies. The Architect shall file a copy of the report with the Contractor's designated representative at the site;
 - (2) Making modifications in drawings and technical specifications and assisting the Contracting Officer in the preparation of change orders and other contract modifications for issuance by the Contracting Officer;
 - (3) Reviewing and making recommendations with respect to - (i) the Contractor's construction progress schedules; (ii) the Contractor's shop and detailed drawings; (iii) the machinery, mechanical and other equipment and materials or other articles proposed for use by the Contractor; and, (iv) the Contractor's price breakdown and progress payment estimates; and,
 - (4) Assisting in inspections, signing Certificates of Completion, and making recommendations with respect to acceptance of work completed under the contract.

4. Other Contracts

The PHA may undertake or award other contracts for additional work at or near the site of the work under this contract. The Contractor shall fully cooperate with the other contractors and with PHA employees and shall carefully adapt scheduling and performing the work under this contract to accommodate the additional work, heeding any direction that may be provided by the Contracting Officer. The Contractor shall not commit or permit any act that will interfere with the performance of work by any other contractor or by PHA employees

Construction Requirements

5. Pre-construction Conference and Notice to Proceed

- (a) Within ten calendar days of contract execution, and prior to the commencement of work, the Contractor shall attend a preconstruction conference with representatives of the PHA, its Architect, and other interested parties convened by the PHA. The conference will serve to acquaint the participants with the general plan of the construction operation and all other requirements of the contract. The PHA will provide the Contractor with the date, time, and place of the conference.
- (b) The contractor shall begin work upon receipt of a written Notice to Proceed from the Contracting Officer or designee. The Contractor shall not begin work prior to receiving such notice.

6. Construction Progress Schedule

- (a) The Contractor shall, within five days after the work commences on the contract or another period of time determined by the Contracting Officer, prepare and submit to the Contracting Officer for approval three copies of a practicable schedule showing the order in which the Contractor proposes to perform the work, and the dates on which the Contractor contemplates starting and completing the several salient features of the work (including acquiring labor, materials, and equipment). The schedule shall be in the form of a progress chart of suitable scale to indicate appropriately the percentage of work scheduled for completion by any given date during the period. If the Contractor fails to submit a schedule within the time prescribed, the Contracting Officer may withhold approval of progress payments or take other remedies under the contract until the Contractor submits the required schedule.
- (b) The Contractor shall enter the actual progress on the chart as required by the Contracting Officer, and immediately deliver three copies of the annotated schedule to the Contracting Officer. If the Contracting Officer determines, upon the basis of inspection conducted pursuant to the clause entitled Inspection and Acceptance of Construction, herein that the Contractor is not meeting the approved schedule, the Contractor shall take steps necessary to improve its progress, including those that may be required by the Contracting Officer, without additional cost to the PHA. In this circumstance, the Contracting Officer may require the Contractor to increase the number of shifts, overtime operations, days of work, and/or the amount of construction plant, and to submit for approval any supplementary schedule or schedules in chart form as the Contracting Officer deems necessary to demonstrate how the approved rate of progress will be regained.
- (c) Failure of the Contractor to comply with the requirements of the Contracting Officer under this clause shall be grounds for a determination by the Contracting Officer that the Contractor is not prosecuting the work with sufficient diligence to ensure completion within the time specified in the Contract. Upon making this determination, the Contracting Officer may terminate the Contractor's right to proceed with the work, or any separable part of it, in accordance with the Default clause of this contract.

7. Site Investigation and Conditions Affecting the Work

- (a) The Contractor acknowledges that it has taken steps reasonably necessary to ascertain the nature and location of the work, and that it has investigated and satisfied itself as to the general and local conditions which can affect the work or its cost, including but not limited to, (1) conditions bearing upon transportation, disposal, handling, and storage of materials; (2) the availability of labor, water, electric power, and roads; (3) uncertainties of weather, river stages, tides, or similar physical conditions at the site; (4) the conformation and conditions of the ground; and (5) the character of equipment and facilities needed preliminary to and during work performance. The Contractor also acknowledges that it has satisfied itself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is

reasonably ascertainable from an inspection of the site, including all exploratory work done by the PHA, as well as from the drawings and specifications made a part of this contract. Any failure of the Contractor to take the actions described and acknowledged in this paragraph will not relieve the Contractor from responsibility for estimating properly the difficulty and cost of successfully performing the work, or for proceeding to successfully perform the work without additional expense to the PHA.

- (b) The PHA assumes no responsibility for any conclusions or interpretations made by the Contractor based on the information made available by the PHA. Nor does the PHA assume responsibility for any understanding reached or representation made concerning conditions which can affect the work by any of its officers or agents before the execution of this contract, unless that understanding or representation is expressly stated in this contract.

8. Differing Site Conditions

- (a) The Contractor shall promptly, and before the conditions are disturbed, give a written notice to the Contracting Officer of (1) subsurface or latent physical conditions at the site which differ materially from those indicated in this contract, or (2) unknown physical conditions at the site(s), of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in the contract.
- (b) The Contracting Officer shall investigate the site conditions promptly after receiving the notice. Work shall not proceed at the affected site, except at the Contractor's risk, until the Contracting Officer has provided written instructions to the Contractor. If the conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performing any part of the work under this contract, whether or not changed as a result of the conditions, the Contractor shall file a claim in writing to the PHA within ten days after receipt of such instructions and, in any event, before proceeding with the work. An equitable adjustment in the contract price, the delivery schedule, or both shall be made under this clause and the contract modified in writing accordingly.
- (c) No request by the Contractor for an equitable adjustment to the contract under this clause shall be allowed, unless the Contractor has given the written notice required; provided, that the time prescribed in (a) above for giving written notice may be extended by the Contracting Officer.
- (d) No request by the Contractor for an equitable adjustment to the contract for differing site conditions shall be allowed if made after final payment under this contract.

9. Specifications and Drawings for Construction

- (a) The Contractor shall keep on the work site a copy of the drawings and specifications and shall at all times give the Contracting Officer access thereto. Anything mentioned in the specifications and not shown on the drawings, or shown on the drawings and not mentioned in the specifications, shall be of like effect as if shown or mentioned in both. In case of difference between drawings and specifications, the specifications shall govern. In case of discrepancy in the figures, in the drawings, or in the specifications, the matter shall be

promptly submitted to the Contracting Officer, who shall promptly make a determination in writing. Any adjustment by the Contractor without such a determination shall be at its own risk and expense. The Contracting Officer shall furnish from time to time such detailed drawings and other information as considered necessary, unless otherwise provided.

- (b) Wherever in the specifications or upon the drawings the words "directed", "required", "ordered", "designated", "prescribed", or words of like import are used, it shall be understood that the "direction", "requirement", "order", "designation", or "prescription", or "the Contracting Officer is intended and similarly the words "approved", "acceptable", "satisfactory", or words of like import shall mean "approved by", or "acceptable to", or "satisfactory to" the Contracting Officer, unless otherwise expressly stated.
- (c) Where "as shown" "as indicated", "as detailed", or of similar import are used, it shall be understood that the reference is made to the drawings accompanying this contract unless stated otherwise. The word "provided" as used herein shall be understood to mean "provide complete in place" that is "furnished and installed".
- (d) "Shop drawings" means drawings, submitted to the PHA by the Contractor, subcontractor, or any lower tier subcontractor, showing in detail (1) the proposed fabrication and assembly of structural elements and (2) the installation (i.e., form, fit, and attachment details) of materials of equipment. It includes drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, and similar materials furnished by the Contractor to explain in detail specific portions of the work required by the contract. The PHA may duplicate, use, and disclose in any manner and for any purpose shop drawings delivered under this contract.
- (e) If this contract requires shop drawings, the Contractor shall coordinate all such drawings, and review them for accuracy, completeness, and compliance with other contract requirements and shall indicate its approval thereon as evidence of such coordination and review. Shop drawings submitted to the Contracting Officer without evidence of the Contractor's approval may be returned for resubmission. The Contracting Officer will indicate an approval or disapproval of the shop drawings and if not approved as submitted shall indicate the PHA's reasons therefore. Any work done before such approval shall be at the Contractor's risk. Approval by the Contracting Officer shall not relieve the Contractor from responsibility for any errors or omissions in such drawings, nor from responsibility for complying with the requirements of this contract, except with respect to variations described and approved in accordance with (f) below.
- (f) If shop drawings show variations from the contract requirements, the Contractor shall describe such variations in writing, separate from the drawings, at the time of submission. If the Architect approves any such variation and the Contracting Officer concurs, the Contracting Officer shall issue an appropriate modification to the contract, except that, if the variation is minor or does not involve a change in price or in time of performance, a modification need not be issued.
- (g) It shall be the responsibility of the Contractor to make timely requests of the PHA for such large scale and full size drawings, color schemes, and other additional information, not already in his possession, which shall be

required in the planning and production of the work. Such requests may be submitted as the need arises, but each such request shall be filed in ample time to permit appropriate action to be taken by all parties involved so as to avoid delay.

- (h) The Contractor shall submit to the Contracting Officer for approval four copies (unless otherwise indicated) of all shop drawings as called for under the various headings of these specifications. Three sets (unless otherwise indicated) of all shop drawings, will be retained by the PHA and one set will be returned to the Contractor. As required by the Contracting Officer, the Contractor, upon completing the work under this contract, shall furnish a complete set of all shop drawings as finally approved. These drawings shall show all changes and revisions made up to the time the work is completed and accepted.
- (i) This clause shall be included in all subcontracts at any tier. It shall be the responsibility of the Contractor to ensure that all shop drawings prepared by subcontractors are submitted to the Contracting Officer.

10. As-Built Drawings

- (a) "As-built drawings," as used in this clause, means drawings submitted by the Contractor or subcontractor at any tier to show the construction of a particular structure or work as actually completed under the contract. "As-built drawings" shall be synonymous with "Record drawings."
- (b) As required by the Contracting Officer, the Contractor shall provide the Contracting Officer accurate information to be used in the preparation of permanent as-built drawings. For this purpose, the Contractor shall record on one set of contract drawings all changes from the installations originally indicated, and record final locations of underground lines by depth from finish grade and by accurate horizontal offset distances to permanent surface improvements such as buildings, curbs, or edges of walks.
- (c) This clause shall be included in all subcontracts at any tier. It shall be the responsibility of the Contractor to ensure that all as-built drawings prepared by subcontractors are submitted to the Contracting Officer.

11. Material and Workmanship

- (a) All equipment, material, and articles furnished under this contract shall be new and of the most suitable grade for the purpose intended, unless otherwise specifically provided in this contract. References in the contract to equipment, material, articles, or patented processes by trade name, make, or catalog number, shall be regarded as establishing a standard of quality and shall not be construed as limiting competition. The Contractor may, at its option, use any equipment, material, article, or process that, in the judgment of, and as approved by the Contracting Officer, is equal to that named in the specifications, unless otherwise specifically provided in this contract.
- (b) Approval of equipment and materials.
 - (1) The Contractor shall obtain the Contracting Officer's approval of the machinery and mechanical and other equipment to be incorporated into the work. When requesting approval, the Contractor shall furnish to the Contracting Officer the name of the manufacturer, the model number, and other information concerning the performance, capacity, nature, and rating of the

machinery and mechanical and other equipment. When required by this contract or by the Contracting Officer, the Contractor shall also obtain the Contracting Officer's approval of the material or articles which the Contractor contemplates incorporating into the work. When requesting approval, the Contractor shall provide full information concerning the material or articles. Machinery, equipment, material, and articles that do not have the required approval shall be installed or used at the risk of subsequent rejection.

- (2) When required by the specifications or the Contracting Officer, the Contractor shall submit appropriately marked samples (and certificates related to them) for approval at the Contractor's expense, with all shipping charges prepaid. The Contractor shall label, or otherwise properly mark on the container, the material or product represented, its place of origin, the name of the producer, the Contractor's name, and the identification of the construction project for which the material or product is intended to be used.
- (3) Certificates shall be submitted in triplicate, describing each sample submitted for approval and certifying that the material, equipment or accessory complies with contract requirements. The certificates shall include the name and brand of the product, name of manufacturer, and the location where produced.
- (4) Approval of a sample shall not constitute a waiver of the PHA right to demand full compliance with contract requirements. Materials, equipment and accessories may be rejected for cause even though samples have been approved.
- (5) Wherever materials are required to comply with recognized standards or specifications, such specifications shall be accepted as establishing the technical qualities and testing methods, but shall not govern the number of tests required to be made nor modify other contract requirements. The Contracting Officer may require laboratory test reports on items submitted for approval or may approve materials on the basis of data submitted in certificates with samples. Check tests will be made on materials delivered for use only as frequently as the Contracting Officer determines necessary to insure compliance of materials with the specifications. The Contractor will assume all costs of retesting materials which fail to meet contract requirements and/or testing materials offered in substitution for those found deficient.
- (6) After approval, samples will be kept in the Project office until completion of work. They may be built into the work after a substantial quantity of the materials they represent has been built in and accepted.
- (c) Requirements concerning lead-based paint. The Contractor shall comply with the requirements concerning lead-based paint contained in the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. 4821-4846) as implemented by 24 CFR Part 35.

12. Permits and Codes

- (a) The Contractor shall give all notices and comply with all applicable laws, ordinances, codes, rules and regulations. Notwithstanding the requirement of the Contractor to comply with the drawings and specifications in the contract, all work installed shall comply with all applicable codes and regulations as amended by any

waivers. Before installing the work, the Contractor shall examine the drawings and the specifications for compliance with applicable codes and regulations bearing on the work and shall immediately report any discrepancy it may discover to the Contracting Officer. Where the requirements of the drawings and specifications fail to comply with the applicable code or regulation, the Contracting Officer shall modify the contract by change order pursuant to the clause entitled Changes herein to conform to the code or regulation.

- (b) The Contractor shall secure and pay for all permits, fees, and licenses necessary for the proper execution and completion of the work. Where the PHA can arrange for the issuance of all or part of these permits, fees and licenses, without cost to the Contractor, the contract amount shall be reduced accordingly.

13. Health, Safety, and Accident Prevention

- (a) In performing this contract, the Contractor shall:
- (1) Ensure that no laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his/her health and/or safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation;
 - (2) Protect the lives, health, and safety of other persons;
 - (3) Prevent damage to property, materials, supplies, and equipment; and,
 - (4) Avoid work interruptions.
- (b) For these purposes, the Contractor shall:
- (1) Comply with regulations and standards issued by the Secretary of Labor at 29 CFR Part 1926. Failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act (Public Law 91-54, 83 Stat. 96), 40 U.S.C. 3701 et seq.; and
 - (2) Include the terms of this clause in every subcontract so that such terms will be binding on each subcontractor.
- (c) The Contractor shall maintain an accurate record of exposure data on all accidents incident to work performed under this contract resulting in death, traumatic injury, occupational disease, or damage to property, materials, supplies, or equipment, and shall report this data in the manner prescribed by 29 CFR Part 1904.
- (d) The Contracting Officer shall notify the Contractor of any noncompliance with these requirements and of the corrective action required. This notice, when delivered to the Contractor or the Contractor's representative at the site of the work, shall be deemed sufficient notice of the noncompliance and corrective action required. After receiving the notice, the Contractor shall immediately take corrective action. If the Contractor fails or refuses to take corrective action promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. The Contractor shall not base any claim or request for equitable adjustment for additional time or money on any stop order issued under these circumstances.
- (e) The Contractor shall be responsible for its subcontractors' compliance with the provisions of this clause. The Contractor shall take such action with respect to any subcontract as the PHA, the Secretary of Housing and Urban Development, or the Secretary of Labor shall direct as a means of enforcing such provisions.

14. Temporary Heating

The Contractor shall provide and pay for temporary heating, covering, and enclosures necessary to properly protect all work and materials against damage by dampness and cold, to dry out the work, and to facilitate the completion of the work. Any permanent heating equipment used shall be turned over to the PHA in the condition and at the time required by the specifications.

15. Availability and Use of Utility Services

- (a) The PHA shall make all reasonably required amounts of utilities available to the Contractor from existing outlets and supplies, as specified in the contract. Unless otherwise provided in the contract, the amount of each utility service consumed shall be charged to or paid for by the Contractor at prevailing rates charged to the PHA or, where the utility is produced by the PHA, at reasonable rates determined by the Contracting Officer. The Contractor shall carefully conserve any utilities furnished without charge.
- (b) The Contractor, at its expense and in a manner satisfactory to the Contracting Officer, shall install and maintain all necessary temporary connections and distribution lines, and all meters required to measure the amount of each utility used for the purpose of determining charges. Before final acceptance of the work by the PHA, the Contractor shall remove all the temporary connections, distribution lines, meters, and associated paraphernalia.

16. Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements

- (a) The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work site, which are not to be removed under this contract, and which do not unreasonably interfere with the work required under this contract.
- (b) The Contractor shall only remove trees when specifically authorized to do so, and shall avoid damaging vegetation that will remain in place. If any limbs or branches of trees are broken during performance of this contract, or by the careless operation of equipment, or by workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the Contracting Officer.
- (c) The Contractor shall protect from damage all existing improvements and utilities (1) at or near the work site and (2) on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor. Prior to disturbing the ground at the construction site, the Contractor shall ensure that all underground utility lines are clearly marked.
- (d) The Contractor shall shore up, brace, underpin, secure, and protect as necessary all foundations and other parts of existing structures adjacent to, adjoining, and in the vicinity of the site, which may be affected by the excavations or other operations connected with the construction of the project.
- (e) Any equipment temporarily removed as a result of work under this contract shall be protected, cleaned, and replaced in the same condition as at the time of award of this contract.

- (f) New work which connects to existing work shall correspond in all respects with that to which it connects and/or be similar to existing work unless otherwise required by the specifications.
- (g) No structural members shall be altered or in any way weakened without the written authorization of the Contracting Officer, unless such work is clearly specified in the plans or specifications.
- (h) If the removal of the existing work exposes discolored or unfinished surfaces, or work out of alignment, such surfaces shall be refinished, or the material replaced as necessary to make the continuous work uniform and harmonious. This, however, shall not be construed to require the refinishing or reconstruction of dissimilar finishes previously exposed, or finished surfaces in good condition, but in different planes or on different levels when brought together by the removal of intervening work, unless such refinishing or reconstruction is specified in the plans or specifications.
- (i) The Contractor shall give all required notices to any adjoining or adjacent property owner or other party before the commencement of any work.
- (j) The Contractor shall indemnify and save harmless the PHA from any damages on account of settlement or the loss of lateral support of adjoining property, any damages from changes in topography affecting drainage, and from all loss or expense and all damages for which the PHA may become liable in consequence of such injury or damage to adjoining and adjacent structures and their premises.
- (k) The Contractor shall repair any damage to vegetation, structures, equipment, utilities, or improvements, including those that are the property of a third party, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work. If the Contractor fails or refuses to repair the damage promptly, the Contracting Officer may have the necessary work performed and charge the cost to the Contractor.

17. Temporary Buildings and Transportation of Materials

- (a) Temporary buildings (e.g., storage sheds, shops, offices, sanitary facilities) and utilities may be erected by the Contractor only with the approval of the Contracting Officer and shall be built with labor and materials furnished by the Contractor without expense to the PHA. The temporary buildings and utilities shall remain the property of the Contractor and shall be removed by the Contractor at its expense upon completion of the work. With the written consent of the Contracting Officer, the buildings and utilities may be abandoned and need not be removed.
- (b) The Contractor shall, as directed by the Contracting Officer, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the Contracting Officer. When materials are transported in prosecuting the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any federal, state, or local law or regulation. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads.

18. Clean Air and Water

The contractor shall comply with the Clean Air Act, as amended, 42 USC 7401 et seq., the Federal Water Pollution Control Water Act, as amended, 33 U.S.C. 1251 et seq., and standards issued pursuant thereto in the facilities in which this contract is to be performed.

19. Energy Efficiency

The Contractor shall comply with mandatory standards and policies relating to energy efficiency which are contained in the energy conservation plan issued in compliance with the Energy Policy and Conservation Act (Pub.L. 94-163) for the State in which the work under the contract is performed.

20. Inspection and Acceptance of Construction

- (a) Definitions. As used in this clause -
 - (1) "Acceptance" means the act of an authorized representative of the PHA by which the PHA approves and assumes ownership of the work performed under this contract. Acceptance may be partial or complete.
 - (2) "Inspection" means examining and testing the work performed under the contract (including, when appropriate, raw materials, equipment, components, and intermediate assemblies) to determine whether it conforms to contract requirements.
 - (3) "Testing" means that element of inspection that determines the properties or elements, including functional operation of materials, equipment, or their components, by the application of established scientific principles and procedures.
- (b) The Contractor shall maintain an adequate inspection system and perform such inspections as will ensure that the work performed under the contract conforms to contract requirements. All work is subject to PHA inspection and test at all places and at all reasonable times before acceptance to ensure strict compliance with the terms of the contract.
- (c) PHA inspections and tests are for the sole benefit of the PHA and do not: (1) relieve the Contractor of responsibility for providing adequate quality control measures; (2) relieve the Contractor of responsibility for loss or damage of the material before acceptance; (3) constitute or imply acceptance; or, (4) affect the continuing rights of the PHA after acceptance of the completed work under paragraph (j) below.
- (d) The presence or absence of the PHA inspector does not relieve the Contractor from any contract requirement, nor is the inspector authorized to change any term or condition of the specifications without the Contracting Officer's written authorization. All instructions and approvals with respect to the work shall be given to the Contractor by the Contracting Officer.
- (e) The Contractor shall promptly furnish, without additional charge, all facilities, labor, and material reasonably needed for performing such safe and convenient inspections and tests as may be required by the Contracting Officer. The PHA may charge to the Contractor any additional cost of inspection or test when work is not ready at the time specified by the Contractor for inspection or test, or when prior rejection makes reinspection or retest necessary. The PHA shall perform all inspections and tests in a manner that will not unnecessarily delay the work. Special, full size, and performance tests shall be performed as described in the contract.

- (f) The PHA may conduct routine inspections of the construction site on a daily basis.
- (g) The Contractor shall, without charge, replace or correct work found by the PHA not to conform to contract requirements, unless the PHA decides that it is in its interest to accept the work with an appropriate adjustment in contract price. The Contractor shall promptly segregate and remove rejected material from the premises.
- (h) If the Contractor does not promptly replace or correct rejected work, the PHA may (1) by contract or otherwise, replace or correct the work and charge the cost to the Contractor, or (2) terminate for default the Contractor's right to proceed.
- (i) If any work requiring inspection is covered up without approval of the PHA, it must, if requested by the Contracting Officer, be uncovered at the expense of the Contractor. If at any time before final acceptance of the entire work, the PHA considers it necessary or advisable, to examine work already completed by removing or tearing it out, the Contractor, shall on request, promptly furnish all necessary facilities, labor, and material. If such work is found to be defective or nonconforming in any material respect due to the fault of the Contractor or its subcontractors, the Contractor shall defray all the expenses of the examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the contract, the Contracting Officer shall make an equitable adjustment to cover the cost of the examination and reconstruction, including, if completion of the work was thereby delayed, an extension of time.
- (j) The Contractor shall notify the Contracting Officer, in writing, as to the date when in its opinion all or a designated portion of the work will be substantially completed and ready for inspection. If the Architect determines that the state of preparedness is as represented, the PHA will promptly arrange for the inspection. Unless otherwise specified in the contract, the PHA shall accept, as soon as practicable after completion and inspection, all work required by the contract or that portion of the work the Contracting Officer determines and designates can be accepted separately. Acceptance shall be final and conclusive except for latent defects, fraud, gross mistakes amounting to fraud, or the PHA's right under any warranty or guarantee.

21. Use and Possession Prior to Completion

- (a) The PHA shall have the right to take possession of or use any completed or partially completed part of the work. Before taking possession of or using any work, the Contracting Officer shall furnish the Contractor a list of items of work remaining to be performed or corrected on those portions of the work that the PHA intends to take possession of or use. However, failure of the Contracting Officer to list any item of work shall not relieve the Contractor of responsibility for complying with the terms of the contract. The PHA's possession or use shall not be deemed an acceptance of any work under the contract.
- (b) While the PHA has such possession or use, the Contractor shall be relieved of the responsibility for (1) the loss of or damage to the work resulting from the PHA's possession or use, notwithstanding the terms of the clause entitled Permits and Codes herein; (2) all maintenance costs on the areas occupied; and, (3) furnishing heat, light, power, and water used in the areas

occupied without proper remuneration therefore. If prior possession or use by the PHA delays the progress of the work or causes additional expense to the Contractor, an equitable adjustment shall be made in the contract price or the time of completion, and the contract shall be modified in writing accordingly.

22. Warranty of Title

The Contractor warrants good title to all materials, supplies, and equipment incorporated in the work and agrees to deliver the premises together with all improvements thereon free from any claims, liens or charges, and agrees further that neither it nor any other person, firm or corporation shall have any right to a lien upon the premises or anything appurtenant thereto.

23. Warranty of Construction

- (a) In addition to any other warranties in this contract, the Contractor warrants, except as provided in paragraph (j) of this clause, that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, or workmanship performed by the Contractor or any subcontractor or supplier at any tier. This warranty shall continue for a period of 2 years (one year unless otherwise indicated) from the date of final acceptance of the work. If the PHA takes possession of any part of the work before final acceptance, this warranty shall continue for a period of (one year unless otherwise indicated) from the date that the PHA takes possession.
- (b) The Contractor shall remedy, at the Contractor's expense, any failure to conform, or any defect. In addition, the Contractor shall remedy, at the Contractor's expense, any damage to PHA-owned or controlled real or personal property when the damage is the result of—
 - (1) The Contractor's failure to conform to contract requirements; or
 - (2) Any defects of equipment, material, workmanship or design furnished by the Contractor.
- (c) The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for (one year unless otherwise indicated) from the date of repair or replacement.
- (d) The Contracting Officer shall notify the Contractor, in writing, within a reasonable time after the discovery of any failure, defect or damage.
- (e) If the Contractor fails to remedy any failure, defect, or damage within a reasonable time after receipt of notice, the PHA shall have the right to replace, repair or otherwise remedy the failure, defect, or damage at the Contractor's expense.
- (f) With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall:
 - (1) Obtain all warranties that would be given in normal commercial practice;
 - (2) Require all warranties to be executed in writing, for the benefit of the PHA; and,
 - (3) Enforce all warranties for the benefit of the PHA.
- (g) In the event the Contractor's warranty under paragraph (a) of this clause has expired, the PHA may bring suit at its own expense to enforce a subcontractor's, manufacturer's or supplier's warranty.

- (h) Unless a defect is caused by the negligence of the Contractor or subcontractor or supplier at any tier, the Contractor shall not be liable for the repair of any defect of material or design furnished by the PHA nor for the repair of any damage that results from any defect in PHA furnished material or design.
- (i) Notwithstanding any provisions herein to the contrary, the establishment of the time periods in paragraphs (a) and (c) above relate only to the specific obligation of the Contractor to correct the work, and have no relationship to the time within which its obligation to comply with the contract 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 its obligation other than specifically to correct the work.
- (j) This warranty shall not limit the PHA's rights under the Inspection and Acceptance of Construction clause of this contract with respect to latent defects, gross mistakes or fraud.

24. Prohibition Against Liens

The Contractor is prohibited from placing a lien on the PHA's property. This prohibition shall apply to all subcontractors at any tier and all materials suppliers.

Administrative Requirements

25. Contract Period

this contract within _____ calendar days of the effective date of the contract, or within the time schedule established in the notice to proceed issued by the Contracting Officer.

26. Order of Provisions

In the event of a conflict between these General Conditions and the Specifications, the General Conditions shall prevail. In the event of a conflict between the contract and any applicable state or local law or regulation, the state or local law or regulation shall prevail; provided that such state or local law or regulation does not conflict with, or is less restrictive than applicable federal law, regulation, or Executive Order. In the event of such a conflict, applicable federal law, regulation, and Executive Order shall prevail.

27. Payments

- (a) The PHA shall pay the Contractor the price as provided in this contract.
- (b) The PHA shall make progress payments approximately every 30 days as the work proceeds, on estimates of work accomplished which meets the standards of quality established under the contract, as approved by the Contracting Officer. The PHA may, subject to written determination and approval of the Contracting Officer, make more frequent payments to contractors which are qualified small businesses.
- (c) Before the first progress payment under this contract, the Contractor shall furnish, in such detail as requested by the Contracting Officer, a breakdown of the total contract price showing the amount included therein for each principal category of the work, which shall substantiate the payment amount requested in order to provide a

basis for determining progress payments. The breakdown shall be approved by the Contracting Officer and must be acceptable to HUD. If the contract covers more than one project, the Contractor shall furnish a separate breakdown for each. The values and quantities employed in making up this breakdown are for determining the amount of progress payments and shall not be construed as a basis for additions to or deductions from the contract price. The Contractor shall prorate its overhead and profit over the construction period of the contract.

- (d) The Contractor shall submit, on forms provided by the PHA, periodic estimates showing the value of the work performed during each period based upon the approved submitted not later than 30 days in advance of the date set for payment and are subject to correction and revision as required. The estimates must be approved by the Contracting Officer with the concurrence of the Architect prior to payment. If the contract covers more than one project, the Contractor shall furnish a separate progress payment estimate for each.
- (e) Along with each request for progress payments and the required estimates, the Contractor shall furnish the following certification, or payment shall not be made: I hereby certify, to the best of my knowledge and belief, that:
 - (1) The amounts requested are only for performance in accordance with the specifications, terms, and conditions of the contract;
 - (2) Payments to subcontractors and suppliers have been made from previous payments received under the contract, and timely payments will be made from the proceeds of the payment covered by this certification, in accordance with subcontract agreements; and,
 - (3) This request for progress payments does not include any amounts which the prime contractor intends to withhold or retain from a subcontractor or supplier in accordance with the terms and conditions of the subcontract.

Name:

Title:

Date:

- (f) Except as otherwise provided in State law, the PHA shall retain ten (10) percent of the amount of progress payments until completion and acceptance of all work under the contract; except, that if upon completion of 50 percent of the work, the Contracting Officer, after consulting with the Architect, determines that the Contractor's performance and progress are satisfactory, the PHA may make the remaining payments in full for the work subsequently completed. If the Contracting Officer subsequently determines that the Contractor's performance and progress are unsatisfactory, the PHA shall reinstate the ten (10) percent (or other percentage as provided in State law) retainage until such time as the Contracting Officer determines that performance and progress are satisfactory.
- (g) The Contracting Officer may authorize material delivered on the site and preparatory work done to be taken into consideration when computing progress payments.

Material delivered to the Contractor at locations other than the site may also be taken into consideration if the Contractor furnishes satisfactory evidence that (1) it has acquired title to such material; (2) the material is properly stored in a bonded warehouse, storage yard, or similar suitable place as may be approved by the Contracting Officer; (3) the material is insured to cover its full value; and (4) the material will be used to perform this contract. Before any progress payment which includes delivered material is made, the Contractor shall furnish such documentation as the Contracting Officer may require to assure the protection of the PHA's interest in such materials. The Contractor shall remain responsible for such stored material notwithstanding the transfer of title to the PHA.

- (h) All material and work covered by progress payments made shall, at the time of payment become the sole property of the PHA, but this shall not be construed as (1) relieving the Contractor from the sole responsibility for all material and work upon which payments have been made or the restoration of any damaged work; or, (2) waiving the right of the PHA to require the fulfillment of all of the terms of the contract. In the event the work of the Contractor has been damaged by other contractors or persons other than employees of the PHA in the course of their employment, the Contractor shall restore such damaged work without cost to the PHA and to seek redress for its damage only from those who directly caused it.
- (i) The PHA shall make the final payment due the Contractor under this contract after (1) completion and final acceptance of all work; and (2) presentation of release of all claims against the PHA arising by virtue of this contract, other than claims, in stated amounts, that the Contractor has specifically excepted from the operation of the release. Each such exception shall embrace no more than one claim, the basis and scope of which shall be clearly defined. The amounts for such excepted claims shall not be included in the request for final payment. A release may also be required of the assignee if the Contractor's claim to amounts payable under this contract has been assigned.
- (j) Prior to making any payment, the Contracting Officer may require the Contractor to furnish receipts or other evidence of payment from all persons performing work and supplying material to the Contractor, if the Contracting Officer determines such evidence is necessary to substantiate claimed costs.
- (k) The PHA shall not; (1) determine or adjust any claims for payment or disputes arising there under between the Contractor and its subcontractors or material suppliers; or, (2) withhold any moneys for the protection of the subcontractors or material suppliers. The failure or refusal of the PHA to withhold moneys from the Contractor shall in no wise impair the obligations of any surety or sureties under any bonds furnished under this contract.

28. Contract Modifications

- (a) Only the Contracting Officer has authority to modify any term or condition of this contract. Any contract modification shall be authorized in writing.
- (b) The Contracting Officer may modify the contract unilaterally (1) pursuant to a specific authorization stated in a contract clause (e.g., Changes); or (2) for administrative matters which do not change the rights or

responsibilities of the parties (e.g., change in the PHA address). All other contract modifications shall be in the form of supplemental agreements signed by the Contractor and the Contracting Officer.

- (c) When a proposed modification requires the approval of HUD prior to its issuance (e.g., a change order that exceeds the PHA's approved threshold), such modification shall not be effective until the required approval is received by the PHA.

29. Changes

- (a) The Contracting Officer may, at any time, without notice to the sureties, by written order designated or indicated to be a change order, make changes in the work within the general scope of the contract including changes:
 - (1) In the specifications (including drawings and designs);
 - (2) In the method or manner of performance of the work;
 - (3) PHA-furnished facilities, equipment, materials, services, or site; or,
 - (4) Directing the acceleration in the performance of the work.
- (b) Any other written order or oral order (which, as used in this paragraph (b), includes direction, instruction, interpretation, or determination) from the Contracting Officer that causes a change shall be treated as a change order under this clause; provided, that the Contractor gives the Contracting Officer written notice stating (1) the date, circumstances and source of the order and (2) that the Contractor regards the order as a change order.
- (c) Except as provided in this clause, no order, statement or conduct of the Contracting Officer shall be treated as a change under this clause or entitle the Contractor to an equitable adjustment.
- (d) If any change under this clause causes an increase or decrease in the Contractor's cost of, or the time required for the performance of any part of the work under this contract, whether or not changed by any such order, the Contracting Officer shall make an equitable adjustment and modify the contract in writing. However, except for a adjustment based on defective specifications, no proposal for any change under paragraph (b) above shall be allowed for any costs incurred more than 20 days (5 days for oral orders) before the Contractor gives written notice as required. In the case of defective specifications for which the PHA is responsible, the equitable adjustment shall include any increased cost reasonably incurred by the Contractor in attempting to comply with the defective specifications.
- (e) The Contractor must assert its right to an adjustment under this clause within 30 days after (1) receipt of a written change order under paragraph (a) of this clause, or (2) the furnishing of a written notice under paragraph (b) of this clause, by submitting a written statement describing the general nature and the amount of the proposal. If the facts justify it, the Contracting Officer may extend the period for submission. The proposal may be included in the notice required under paragraph (b) above. No proposal by the Contractor for an equitable adjustment shall be allowed if asserted after final payment under this contract.
- (f) The Contractor's written proposal for equitable adjustment shall be submitted in the form of a lump sum proposal supported with an itemized breakdown of all increases and decreases in the contract in at least the following details:

- (1) Direct Costs. Materials (list individual items, the quantity and unit cost of each, and the aggregate cost); Transportation and delivery costs associated with materials; Labor breakdowns by hours or unit costs (identified with specific work to be performed); Construction equipment exclusively necessary for the change; Costs of preparation and/ or revision to shop drawings resulting from the change; Worker's Compensation and Public Liability Insurance; Employment taxes under FICA and FUTA; and, Bond Costs when size of change warrants revision.
- (2) Indirect Costs. Indirect costs may include overhead, general and administrative expenses, and fringe benefits not normally treated as direct costs.
- (3) Profit. The amount of profit shall be negotiated and may vary according to the nature, extent, and complexity of the work required by the change. The allowability of the direct and indirect costs shall be determined in accordance with the Contract Cost Principles and Procedures for Commercial Firms in Part 31 of the Federal Acquisition Regulation (48 CFR 1-31), as implemented by HUD Handbook 2210.18, in effect on the date of this contract. The Contractor shall not be allowed a profit on the profit received by any subcontractor. Equitable adjustments for deleted work shall include a credit for profit and may include a credit for indirect costs. On proposals covering both increases and decreases in the amount of the contract, the application of indirect costs and profit shall be on the net-change in direct costs for the Contractor or subcontractor performing the work.
- (g) The Contractor shall include in the proposal its request for time extension (if any), and shall include sufficient information and dates to demonstrate whether and to what extent the change will delay the completion of the contract in its entirety.
- (h) The Contracting Officer shall act on proposals within 30 days after their receipt, or notify the Contractor of the date when such action will be taken.
- (i) Failure to reach an agreement on any proposal shall be a dispute under the clause entitled Disputes herein. Nothing in this clause, however, shall excuse the Contractor from proceeding with the contract as changed.
- (j) Except in an emergency endangering life or property, no change shall be made by the Contractor without a prior order from the Contracting Officer.

30. Suspension of Work

- (a) The Contracting Officer may order the Contractor in writing to suspend, delay, or interrupt all or any part of the work of this contract for the period of time that the Contracting Officer determines appropriate for the convenience of the PHA.
- (b) If the performance of all or any part of the work is, for an unreasonable period of time, suspended, delayed, or interrupted (1) by an act of the Contracting Officer in the administration of this contract, or (2) by the Contracting Officer's failure to act within the time specified (or within a reasonable time if not specified) in this contract an adjustment shall be made for any increase in the cost of performance of the contract (excluding profit) necessarily caused by such unreasonable suspension, delay, or interruption and the contract modified in writing accordingly. However, no adjustment shall be made under this clause for any suspension, delay, or interruption to the extent that performance would have

been so suspended, delayed, or interrupted by any other cause, including the fault or negligence of the Contractor or for which any equitable adjustment is provided for or excluded under any other provision of this contract.

- (c) A claim under this clause shall not be allowed (1) for any costs incurred more than 20 days before the Contractor shall have notified the Contracting Officer in writing of the act or failure to act involved (but this requirement shall not apply as to a claim resulting from a suspension order); and, (2) unless the claim, in an amount stated, is asserted in writing as soon as practicable after the termination of the suspension, delay, or interruption, but not later than the date of final payment under the contract.

31. Disputes

- (a) "Claim," as used in this clause, means a written demand or written assertion by one of the contracting parties seeking, as a matter of right, the payment of money in a sum certain, the adjustment or interpretation of contract terms, or other relief arising under or relating to the contract. A claim arising under the contract, unlike a claim relating to the contract, is a claim that can be resolved under a contract clause that provides for the relief sought by the claimant. A voucher, invoice, or other routine request for payment that is not in dispute when submitted is not a claim. The submission may be converted to a claim by complying with the requirements of this clause, if it is disputed either as to liability or amount or is not acted upon in a reasonable time.
- (b) Except for disputes arising under the clauses entitled Labor Standards - Davis Bacon and Related Acts, herein, all disputes arising under or relating to this contract, including any claims for damages for the alleged breach thereof which are not disposed of by agreement, shall be resolved under this clause.
- (c) All claims by the Contractor shall be made in writing and submitted to the Contracting Officer for a written decision. A claim by the PHA against the Contractor shall be subject to a written decision by the Contracting Officer.
- (d) The Contracting Officer shall, within 60 (unless otherwise indicated) days after receipt of the request, decide the claim or notify the Contractor of the date by which the decision will be made.
- (e) The Contracting Officer's decision shall be final unless the Contractor (1) appeals in writing to a higher level in the PHA in accordance with the PHA's policy and procedures, (2) refers the appeal to an independent mediator or arbitrator, or (3) files suit in a court of competent jurisdiction. Such appeal must be made within (30 unless otherwise indicated) days after receipt of the Contracting Officer's decision.
- (f) The Contractor shall proceed diligently with performance of this contract, pending final resolution of any request for relief, claim, appeal, or action arising under or relating to the contract, and comply with any decision of the Contracting Officer.

32. Default

- (a) If the Contractor refuses or fails to prosecute the work, or any separable part thereof, with the diligence that will insure its completion within the time specified in this contract, or any extension thereof, or fails to complete said work within this time, the Contracting Officer may, by written notice to the Contractor, terminate the right to

proceed with the work (or separable part of the work) that has been delayed. In this event, the PHA may take over the work and complete it, by contract or otherwise, and may take possession of and use any materials, equipment, and plant on the work site necessary for completing the work. The Contractor and its sureties shall be liable for any damage to the PHA resulting from the Contractor's refusal or failure to complete the work within the specified time, whether or not the Contractor's right to proceed with the work is terminated. This liability includes any increased costs incurred by the PHA in completing the work.

- (b) The Contractor's right to proceed shall not be terminated or the Contractor charged with damages under this clause if—
- (1) The delay in completing the work arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor. Examples of such causes include (i) acts of God, or of the public enemy, (ii) acts of the PHA or other governmental entity in either its sovereign or contractual capacity, (iii) acts of another contractor in the performance of a contract with the PHA, (iv) fires, (v) floods, (vi) epidemics, (vii) quarantine restrictions, (viii) strikes, (ix) freight embargoes, (x) unusually severe weather, or (xi) delays of subcontractors or suppliers at any tier arising from unforeseeable causes beyond the control and without the fault or negligence of both the Contractor and the subcontractors or suppliers; and
 - (2) The Contractor, within days (10 days unless otherwise indicated) from the beginning of such delay (unless extended by the Contracting Officer) notifies the Contracting Officer in writing of the causes of delay. The Contracting Officer shall ascertain the facts and the extent of the delay. If, in the judgment of the Contracting Officer, the findings of fact warrant such action, time for completing the work shall be extended by written modification to the contract. The findings of the Contracting Officer shall be reduced to a written decision which shall be subject to the provisions of the Disputes clause of this contract.
- (c) If, after termination of the Contractor's right to proceed, it is determined that the Contractor was not in default, or that the delay was excusable, the rights and obligations of the parties will be the same as if the termination had been for convenience of the PHA.

33. Liquidated Damages

- (a) If the Contractor fails to complete the work within the time specified in the contract, or any extension, as specified in the clause entitled Default of this contract, the Contractor shall pay to the PHA as liquidated damages, the sum of \$ _____ [Contracting Officer insert amount] for each day of delay. If different completion dates are specified in the contract for separate parts or stages of the work, the amount of liquidated damages shall be assessed on those parts or stages which are delayed. To the extent that the Contractor's delay or nonperformance is excused under another clause in this contract, liquidated damages shall not be due the PHA. The Contractor remains liable for damages caused other than by delay.
- (b) If the PHA terminates the Contractor's right to proceed, the resulting damage will consist of liquidated damages until such reasonable time as may be required for final

completion of the work together with any increased costs occasioned the PHA in completing the work.

- (c) If the PHA does not terminate the Contractor's right to proceed, the resulting damage will consist of liquidated damages until the work is completed or accepted.

34. Termination for Convenience

- (a) The Contracting Officer may terminate this contract in whole, or in part, whenever the Contracting Officer determines that such termination is in the best interest of the PHA. Any such termination shall be effected by delivery to the Contractor of a Notice of Termination specifying the extent to which the performance of the work under the contract is terminated, and the date upon which such termination becomes effective.
- (b) If the performance of the work is terminated, either in whole or in part, the PHA shall be liable to the Contractor for reasonable and proper costs resulting from such termination upon the receipt by the PHA of a properly presented claim setting out in detail: (1) the total cost of the work performed to date of termination less the total amount of contract payments made to the Contractor; (2) the cost (including reasonable profit) of settling and paying claims under subcontracts and material orders for work performed and materials and supplies delivered to the site, payment for which has not been made by the PHA to the Contractor or by the Contractor to the subcontractor or supplier; (3) the cost of preserving and protecting the work already performed until the PHA or assignee takes possession thereof or assumes responsibility therefore; (4) the actual or estimated cost of legal and accounting services reasonably necessary to prepare and present the termination claim to the PHA; and (5) an amount constituting a reasonable profit on the value of the work performed by the Contractor.
- (c) The Contracting Officer will act on the Contractor's claim within days (60 days unless otherwise indicated) of receipt of the Contractor's claim.
- (d) Any disputes with regard to this clause are expressly made subject to the provisions of the Disputes clause of this contract.

35. Assignment of Contract

The Contractor shall not assign or transfer any interest in this contract; except that claims for monies due or to become due from the PHA under the contract may be assigned to a bank, trust company, or other financial institution. Such assignments of claims shall only be made with the written concurrence of the Contracting Officer. If the Contractor is a partnership, this contract shall inure to the benefit of the surviving or remaining member(s) of such partnership as approved by the Contracting Officer.

36. Insurance

- (a) Before commencing work, the Contractor and each subcontractor shall furnish the PHA with certificates of insurance showing the following insurance is in force and will insure all operations under the Contract:
- (1) Workers' Compensation, in accordance with state or Territorial Workers' Compensation laws.
 - (2) Commercial General Liability with a combined single limit for bodily injury and property damage of not less than \$ 2MM [Contracting Officer insert amount]

per occurrence to protect the Contractor and each subcontractor against claims for bodily injury or death and damage to the property of others. This shall cover the use of all equipment, hoists, and vehicles on the site(s) not covered by Automobile Liability under (3) below. If the Contractor has a "claims made" policy, then the following additional requirements apply: the policy must provide a "retroactive date" which must be on or before the execution date of the Contract; and the extended reporting period may not be less than five years following the completion date of the Contract.

- (3) Automobile Liability on owned and non-owned motor vehicles used on the site(s) or in connection therewith for a combined single limit for bodily injury and property damage of not less than \$ 500K [Contracting Officer insert amount] per occurrence.
- (b) Before commencing work, the Contractor shall furnish the PHA with a certificate of insurance evidencing that Builder's Risk (fire and extended coverage) Insurance on all work in place and/or materials stored at the building site(s), including foundations and building equipment, is in force. The Builder's Risk Insurance shall be for the benefit of the Contractor and the PHA as their interests may appear and each shall be named in the policy or policies as an insured. The Contractor in installing equipment supplied by the PHA shall carry insurance on such equipment from the time the Contractor takes possession thereof until the Contract work is accepted by the PHA. The Builder's Risk Insurance need not be carried on excavations, piers, footings, or foundations until such time as work on the superstructure is started. It need not be carried on landscape work. Policies shall furnish coverage at all times for the full cash value of all completed construction, as well as materials in place and/or stored at the site(s), whether or not partial payment has been made by the PHA. The Contractor may terminate this insurance on buildings as of the date taken over for occupancy by the PHA. The Contractor is not required to carry Builder's Risk Insurance for modernization work which does not involve structural alterations or additions and where the PHA's existing fire and extended coverage policy can be endorsed to include such work.
- (c) All insurance shall be carried with companies which are financially responsible and admitted to do business in the State in which the project is located. If any such insurance is due to expire during the construction period, the Contractor (including subcontractors, as applicable) shall not permit the coverage to lapse and shall furnish evidence of coverage to the Contracting Officer. All certificates of insurance, as evidence of coverage, shall provide that no coverage may be canceled or non-renewed by the insurance company until at least 30 days prior written notice has been given to the Contracting Officer.

37. Subcontracts

- (a) Definitions. As used in this contract -
- (1) "Subcontract" means any contract, purchase order, or other purchase agreement, including modifications and change orders to the foregoing, entered into by a subcontractor to furnish supplies, materials, equipment, and services for the performance of the prime contract or a subcontract.

- (2) "Subcontractor" means any supplier, vendor, or firm that furnishes supplies, materials, equipment, or services to or for the Contractor or another subcontractor.
- (b) The Contractor shall not enter into any subcontract with any subcontractor who has been temporarily denied participation in a HUD program or who has been suspended or debarred from participating in contracting programs by any agency of the United States Government or of the state in which the work under this contract is to be performed.
- (c) The Contractor shall be as fully responsible for the acts or omissions of its subcontractors, and of persons either directly or indirectly employed by them as for the acts or omissions of persons directly employed by the Contractor.
- (d) The Contractor shall insert appropriate clauses in all subcontracts to bind subcontractors to the terms and conditions of this contract insofar as they are applicable to the work of subcontractors.
- (e) Nothing contained in this contract shall create any contractual relationship between any subcontractor and the PHA or between the subcontractor and HUD.

38. Subcontracting with Small and Minority Firms, Women's Business Enterprise, and Labor Surplus Area Firms

The Contractor shall take the following steps to ensure that, whenever possible, subcontracts are awarded to small business firms, minority firms, women's business enterprises, and labor surplus area firms:

- (a) Placing qualified small and minority businesses and women's business enterprises on solicitation lists;
- (b) Ensuring that small and minority businesses and women's business enterprises are solicited whenever they are potential sources;
- (c) Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority businesses and women's business enterprises;
- (d) Establishing delivery schedules, where the requirements of the contract permit, which encourage participation by small and minority businesses and women's business enterprises; and
- (e) Using the services and assistance of the U.S. Small Business Administration, the Minority Business Development Agency of the U.S. Department of Commerce, and State and local governmental small business agencies.

39. Equal Employment Opportunity

During the performance of this contract, the Contractor agrees as follows:

- (a) The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin, or handicap.
- (b) The Contractor shall take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, national origin, or handicap. Such action shall include, but not be limited to, (1) employment, (2) upgrading, (3) demotion, (4) transfer, (5) recruitment or recruitment advertising, (6) layoff or termination, (7) rates of pay or other forms of compensation, and (8) selection for training, including apprenticeship.

- (c) The Contractor shall post in conspicuous places available to employees and applicants for employment the notices to be provided by the Contracting Officer that explain this clause.
- (d) The Contractor shall, in all solicitations or 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, national origin, or handicap.
- (e) The Contractor shall send, to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, the notice to be provided by the Contracting Officer advising the labor union or workers' representative of the Contractor's commitments under this clause, and post copies of the notice in conspicuous places available to employees and applicants for employment.
- (f) The Contractor shall comply with Executive Order 11246, as amended, and the rules, regulations, and orders of the Secretary of Labor.
- (g) The Contractor shall furnish all information and reports required by Executive Order 11246, as amended, Section 503 of the Rehabilitation Act of 1973, as amended, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto. The Contractor shall permit access to its books, records, and accounts by the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
- (h) In the event of a determination that the Contractor is not in compliance with this clause or any rule, regulation, or order of the Secretary of Labor, this contract may be canceled, terminated, or suspended in whole or in part, and the Contractor may be declared ineligible for further Government contracts, or Federally assisted construction contracts under the procedures authorized in Executive Order 11246, as amended. In addition, sanctions may be imposed and remedies invoked against the Contractor as provided in Executive Order 11246, as amended, the rules, regulations, and orders of the Secretary of Labor, or as otherwise provided by law.
- (i) The Contractor shall include the terms and conditions of this clause in every subcontract or purchase order unless exempted by the rules, regulations, or orders of the Secretary of Labor issued under Executive Order 11246, as amended, so that these terms and conditions will be binding upon each subcontractor or vendor. The Contractor shall take such action with respect to any subcontract or purchase order as the Secretary of Housing and Urban Development or the Secretary of Labor may direct as a means of enforcing such provisions, including sanctions for noncompliance; provided that if the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction, the Contractor may request the United States to enter into the litigation to protect the interests of the United States.
- (j) Compliance with the requirements of this clause shall be to the maximum extent consistent with, but not in derogation of, compliance with section 7(b) of the Indian Self-Determination and Education Assistance Act and the Indian Preference clause of this contract.
- 40. Employment, Training, and Contracting Opportunities for Low-Income Persons, Section 3 of the Housing and Urban Development Act of 1968.**
- (a) The work to be performed under this contract is subject to the requirements of section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u (section 3). The purpose of section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by section 3, shall, to the greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.
- (b) The parties to this contract agree to comply with HUD's regulations in 24 CFR Part 135, which implement section 3. As evidenced by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with the Part 135 regulations.
- (c) The contractor agrees to send to each labor organization or representative of workers with which the contractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the contractor's commitments under this section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The notice shall describe the section 3 preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions; and the anticipated date the work shall begin.
- (d) The contractor agrees to include this section 3 clause in every subcontract subject to compliance with regulations in 24 CFR Part 135, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR Part 135. The contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR Part 135.
- (e) The contractor will certify that any vacant employment positions, including training positions, that are filled (1) after the contractor is selected but before the contract is executed, and (2) with persons other than those to whom the regulations of 24 CFR Part 135 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 24 CFR Part 135.
- (f) Noncompliance with HUD's regulations in 24 CFR Part 135 may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD assisted contracts.
- (g) With respect to work performed in connection with section 3 covered Indian housing assistance, section 7(b) of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450e) also applies to the work to be performed under this contract. Section 7(b) requires that to the greatest extent feasible (i) preference and opportunities for training and employment shall be given to Indians, and (ii) preference in the award of contracts and subcontracts shall be given to Indian organizations and Indian-owned Economic Enterprises. Parties to this contract that are subject to the provisions of section 3 and section 7(b) agree to comply with section 3 to the maximum extent feasible, but not in derogation of compliance with section 7(b).

41. Interest of Members of Congress

No member of or delegate to the Congress of the United States of America shall be admitted to any share or part of this contract or to any benefit that may arise therefrom.

42. Interest of Members, Officers, or Employees and Former Members, Officers, or Employees

No member, officer, or employee of the PHA, no member of the governing body of the locality in which the project is situated, no member of the governing body of the locality in which the PHA was activated, and no other public official of such locality or localities who exercises any functions or responsibilities with respect to the project, shall, during his or her tenure, or for one year thereafter, have any interest, direct or indirect, in this contract or the proceeds thereof.

43. Limitations on Payments made to Influence Certain Federal Financial Transactions

- (a) The Contractor agrees to comply with Section 1352 of Title 31, United States Code which prohibits the use of Federal appropriated funds to pay any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, and officer or employee of Congress, or an employee of a Member of Congress in connection with any of the following covered Federal actions: the awarding of any Federal contract; the making of any Federal grant; the making of any Federal loan; the entering into of any cooperative agreement; or the modification of any Federal contract, grant, loan, or cooperative agreement.
- (b) The Contractor further agrees to comply with the requirement of the Act to furnish a disclosure (OMB Standard Form LLL, Disclosure of Lobbying Activities) if any funds other than Federal appropriated funds (including profit or fee received under a covered Federal transaction) have been paid, or will be paid, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a Federal contract, grant, loan, or cooperative agreement.

44. Royalties and Patents

The Contractor shall pay all royalties and license fees. It shall defend all suits or claims for infringement of any patent rights and shall save the PHA harmless from loss on account thereof; except that the PHA shall be responsible for all such loss when a particular design, process or the product of a particular manufacturer or manufacturers is specified and the Contractor has no reason to believe that the specified design, process, or product is an infringement. If, however, the Contractor has reason to believe that any design, process or product specified is an infringement of a patent, the Contractor shall promptly notify the Contracting Officer. Failure to give such notice shall make the Contractor responsible for resultant loss.

45. Examination and Retention of Contractor's Records

- (a) The PHA, HUD, or Comptroller General of the United States, or any of their duly authorized representatives shall, until 3 years after final payment under this contract, have access to and the right to examine any of the Contractor's directly pertinent books, documents, papers, or other records involving transactions related to this contract for the purpose of making audit, examination, excerpts, and transcriptions.
- (b) The Contractor agrees to include in first-tier subcontracts under this contract a clause substantially the same as paragraph (a) above. "Subcontract," as used in this clause, excludes purchase orders not exceeding \$10,000.
- (c) The periods of access and examination in paragraphs (a) and (b) above for records relating to (1) appeals under the Disputes clause of this contract, (2) litigation or settlement of claims arising from the performance of this contract, or (3) costs and expenses of this contract to which the PHA, HUD, or Comptroller General or any of their duly authorized representatives has taken exception shall continue until disposition of such appeals, litigation, claims, or exceptions.

46. Labor Standards - Davis-Bacon and Related Acts

If the total amount of this contract exceeds \$2,000, the Federal labor standards set forth in the clause below shall apply to the development or construction work to be performed under the contract.

- (a) Minimum Wages.
 - (1) All laborers and mechanics employed under this contract in the development or construction of the project(s) involved will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the regular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits in the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein; provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR 5.5(a)(1)(ii) and the Davis-Bacon poster (WH-1321) shall

be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

- (2) (i) Any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits therefor only when all the following criteria have been met: (A) The work to be performed by the classification requested is not performed by a classification in the wage determination; and (B) The classification is utilized in the area by the construction industry; and (C) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.
- (ii) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division, Employee Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary.
- (iii) In the event the Contractor, the laborers or mechanics to be employed in the classification or their representatives, and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator of the Wage and Hour Division for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary.
- (iv) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (a)(2)(ii) or (iii) of this clause shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in classification.
- (3) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.
- (4) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the

amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program; provided, that the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

- (b) Withholding of funds. HUD or its designee shall, upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the Contractor under this contract or any other Federal contract with the same prime Contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime Contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working in the construction or development of the project, all or part of the wages required by the contract, HUD or its designee may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the Contractor, disburse such amounts withheld for and on account of the Contractor or subcontractor to the respective employees to whom they are due.
- (c) Payrolls and basic records.
- (1) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working in the construction or development of the project. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made, and actual wages paid. Whenever the Secretary of Labor has found, under 29 CFR 5.5(a)(1)(iv), that the wages of any laborer or mechanic include the amount of costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

- (2) (i) The Contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the Contracting Officer for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under subparagraph (c)(1) of this clause. This information may be submitted in any form desired. Optional Form WH-347 (Federal Stock Number 029-005-00014-1) is available for this purpose and may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. The Contractor is responsible for the submission of copies of payrolls by all subcontractors. (Approved by the Office of Management and Budget under OMB Control Number 1214-0149.)
- (ii) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:
- (A) That the payroll for the payroll period contains the information required to be maintained under paragraph (c) (1) of this clause and that such information is correct and complete;
- (B) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3; and
- (C) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.
- (iii) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirements for submission of the "Statement of Compliance" required by subparagraph (c)(2)(ii) of this clause.
- (iv) The falsification of any of the above certifications may subject the Contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 3729 of Title 31 of the United States Code.
- (3) The Contractor or subcontractor shall make the records required under subparagraph (c)(1) available for inspection, copying, or transcription by authorized representatives of HUD or its designee, the Contracting Officer, or the Department of Labor and shall permit such representatives to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to

make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

- (d) (1) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship and Training, Employer and Labor Services (OATELS), or with a State Apprenticeship Agency recognized by OATELS, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by OATELS or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated in this paragraph, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator of the Wage and Hour Division determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event OATELS, or a State Apprenticeship Agency recognized by OATELS, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.
- (2) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under

the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed in the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate in the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate in the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate in the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

- (3) Equal employment opportunity. The utilization of apprentices, trainees, and journeymen under this clause shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.
- (e) Compliance with Copeland Act requirements. The Contractor shall comply with the requirements of 29 CFR Part 3, which are hereby incorporated by reference in this contract.
- (f) Contract termination; debarment. A breach of this contract clause may be grounds for termination of the contract and for debarment as a Contractor and a subcontractor as provided in 29 CFR 5.12.
- (g) Compliance with Davis-Bacon and related Act requirements. All rulings and interpretations of the Davis-Bacon and related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract.
- (h) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this clause shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the PHA, HUD, the U.S. Department of Labor, or the employees or their representatives.
- (i) Certification of eligibility.
 - (1) By entering into this contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded contracts by the United States Government by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

- (2) No part of this contract shall be subcontracted to any person or firm ineligible for award of a United States Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
 - (3) The penalty for making false statements is prescribed in the U. S. Criminal Code, 18 U.S.C. 1001.
- (j) Contract Work Hours and Safety Standards Act. As used in this paragraph, the terms "laborers" and "mechanics" include watchmen and guards.
- (1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics, including watchmen and guards, shall require or permit any such laborer or mechanic in any workweek in which the individual is employed on such work to work in excess of 40 hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.
 - (2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the provisions set forth in subparagraph (j)(1) of this clause, the Contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such Contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic (including watchmen and guards) employed in violation of the provisions set forth in subparagraph (j)(1) of this clause, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by provisions set forth in subparagraph (j)(1) of this clause.
 - (3) Withholding for unpaid wages and liquidated damages. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the Contractor or subcontractor under any such contract or any Federal contract with the same prime Contractor, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime Contractor, such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or subcontractor for unpaid wages and liquidated damages as provided in the provisions set forth in subparagraph (j)(2) of this clause.
- (k) Subcontracts. The Contractor or subcontractor shall insert in any subcontracts all the provisions contained in this clause, and such other clauses as HUD or its designee may by appropriate instructions require, and also a clause requiring the subcontractors to include these provisions in any lower tier subcontracts. The prime Contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all these provisions.

47. Non-Federal Prevailing Wage Rates

- (a) Any prevailing wage rate (including basic hourly rate and any fringe benefits), determined under State or tribal law to be prevailing, with respect to any employee in any trade or position employed under the contract, is inapplicable to the contract and shall not be enforced against the Contractor or any subcontractor, with respect to employees engaged under the contract whenever such non-Federal prevailing wage rate exceeds:
 - (1) The applicable wage rate determined by the Secretary of Labor pursuant to the Davis-Bacon Act (40 U.S.C. 3141 et seq.) to be prevailing in the locality with respect to such trade;
- (b) An applicable apprentice wage rate based thereon specified in an apprenticeship program registered with the U.S. Department of Labor (DOL) or a DOL-recognized State Apprenticeship Agency; or
- (c) An applicable trainee wage rate based thereon specified in a DOL-certified trainee program.

48. Procurement of Recovered Materials.

- (a) In accordance with Section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, the Contractor shall procure items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR Part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition. The Contractor shall procure items designated in the EPA guidelines that contain the highest percentage of recovered materials practicable unless the Contractor determines that such items: (1) are not reasonably available in a reasonable period of time; (2) fail to meet reasonable performance standards, which shall be determined on the basis of the guidelines of the National Institute of Standards and Technology, if applicable to the item; or (3) are only available at an unreasonable price.
- (b) Paragraph (a) of this clause shall apply to items purchased under this contract where: (1) the Contractor purchases in excess of \$10,000 of the item under this contract; or (2) during the preceding Federal fiscal year, the Contractor: (i) purchased any amount of the items for use under a contract that was funded with Federal appropriations and was with a Federal agency or a State agency or agency of a political subdivision of a State; and (ii) purchased a total of in excess of \$10,000 of the item both under and outside that contract.

CONFLICT OF INTEREST QUESTIONNAIRE

For vendor doing business with local governmental entity

FORM CIQ

This questionnaire reflects changes made to the law by H.B. 23, 84th Leg., Regular Session.

This questionnaire is being filed in accordance with Chapter 176, Local Government Code, by a vendor who has a business relationship as defined by Section 176.001(1-a) with a local governmental entity and the vendor meets requirements under Section 176.006(a).

By law this questionnaire must be filed with the records administrator of the local governmental entity not later than the 7th business day after the date the vendor becomes aware of facts that require the statement to be filed. See Section 176.006(a-1), Local Government Code.

A vendor commits an offense if the vendor knowingly violates Section 176.006, Local Government Code. An offense under this section is a misdemeanor.

OFFICE USE ONLY

Date Received

1 Name of vendor who has a business relationship with local governmental entity.

2 Check this box if you are filing an update to a previously filed questionnaire. (The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than the 7th business day after the date on which you became aware that the originally filed questionnaire was incomplete or inaccurate.)

3 Name of local government officer about whom the information is being disclosed.

Name of Officer

4 Describe each employment or other business relationship with the local government officer, or a family member of the officer, as described by Section 176.003(a)(2)(A). Also describe any family relationship with the local government officer. Complete subparts A and B for each employment or business relationship described. Attach additional pages to this Form CIQ as necessary.

A. Is the local government officer or a family member of the officer receiving or likely to receive taxable income, other than investment income, from the vendor?

Yes No

B. Is the vendor receiving or likely to receive taxable income, other than investment income, from or at the direction of the local government officer or a family member of the officer AND the taxable income is not received from the local governmental entity?

Yes No

5 Describe each employment or business relationship that the vendor named in Section 1 maintains with a corporation or other business entity with respect to which the local government officer serves as an officer or director, or holds an ownership interest of one percent or more.

6 Check this box if the vendor has given the local government officer or a family member of the officer one or more gifts as described in Section 176.003(a)(2)(B), excluding gifts described in Section 176.003(a-1).

7

Signature of vendor doing business with the governmental entity

Date

CONFLICT OF INTEREST QUESTIONNAIRE

For vendor doing business with local governmental entity

A complete copy of Chapter 176 of the Local Government Code may be found at <http://www.statutes.legis.state.tx.us/Docs/LG/htm/LG.176.htm>. For easy reference, below are some of the sections cited on this form.

Local Government Code § 176.001(1-a): "Business relationship" means a connection between two or more parties based on commercial activity of one of the parties. The term does not include a connection based on:

- (A) a transaction that is subject to rate or fee regulation by a federal, state, or local governmental entity or an agency of a federal, state, or local governmental entity;
- (B) a transaction conducted at a price and subject to terms available to the public; or
- (C) a purchase or lease of goods or services from a person that is chartered by a state or federal agency and that is subject to regular examination by, and reporting to, that agency.

Local Government Code § 176.003(a)(2)(A) and (B):

(a) A local government officer shall file a conflicts disclosure statement with respect to a vendor if:

(2) the vendor:

(A) has an employment or other business relationship with the local government officer or a family member of the officer that results in the officer or family member receiving taxable income, other than investment income, that exceeds \$2,500 during the 12-month period preceding the date that the officer becomes aware that

- (i) a contract between the local governmental entity and vendor has been executed;
- or
- (ii) the local governmental entity is considering entering into a contract with the vendor;

(B) has given to the local government officer or a family member of the officer one or more gifts that have an aggregate value of more than \$100 in the 12-month period preceding the date the officer becomes aware that:

- (i) a contract between the local governmental entity and vendor has been executed; or
- (ii) the local governmental entity is considering entering into a contract with the vendor.

Local Government Code § 176.006(a) and (a-1)

(a) A vendor shall file a completed conflict of interest questionnaire if the vendor has a business relationship with a local governmental entity and:

- (1) has an employment or other business relationship with a local government officer of that local governmental entity, or a family member of the officer, described by Section 176.003(a)(2)(A);
- (2) has given a local government officer of that local governmental entity, or a family member of the officer, one or more gifts with the aggregate value specified by Section 176.003(a)(2)(B), excluding any gift described by Section 176.003(a-1); or
- (3) has a family relationship with a local government officer of that local governmental entity.

(a-1) The completed conflict of interest questionnaire must be filed with the appropriate records administrator not later than the seventh business day after the later of:

(1) the date that the vendor:

- (A) begins discussions or negotiations to enter into a contract with the local governmental entity; or
- (B) submits to the local governmental entity an application, response to a request for proposals or bids, correspondence, or another writing related to a potential contract with the local governmental entity; or

(2) the date the vendor becomes aware:

- (A) of an employment or other business relationship with a local government officer, or a family member of the officer, described by Subsection (a);
- (B) that the vendor has given one or more gifts described by Subsection (a); or
- (C) of a family relationship with a local government officer.

CERTIFICATE OF INTERESTED PARTIES

FORM 1295

OFFICE USE ONLY

Complete Nos. 1 - 4 and 6 if there are interested parties.
 Complete Nos. 1, 2, 3, 5, and 6 if there are no interested parties.

1 Name of business entity filing form, and the city, state and country of the business entity's place of business.

2 Name of governmental entity or state agency that is a party to the contract for which the form is being filed.

3 Provide the identification number used by the governmental entity or state agency to track or identify the contract, and provide a description of the goods or services to be provided under the contract.

4 Name of Interested Party	City, State, Country (place of business)	Nature of Interest (check applicable)	
		Controlling	Intermediary
DO NOT COMPLETE AT THIS TIME TO BE COMPLETED BY AWARDED VENDOR ONLY			

5 Check only if there is NO Interested Party.

6 AFFIDAVIT I swear, or affirm, under penalty of perjury, that the above disclosure is true and correct.

 Signature of authorized agent of contracting business entity

AFFIX NOTARY STAMP / SEAL ABOVE

Sworn to and subscribed before me, by the said _____, this the _____ day of _____, 20 _____, to certify which, witness my hand and seal of office.

 Signature of officer administering oath Printed name of officer administering oath Title of officer administering oath

ADD ADDITIONAL PAGES AS NECESSARY

DISCLOSURE OF LOBBYING ACTIVITIES

Complete this form to disclose lobbying activities pursuant to 31 U.S.C. 1352

Approved by OMB

0348-0046

(See reverse for public burden disclosure.)

1. Type of Federal Action: <input type="checkbox"/> a. contract <input type="checkbox"/> b. grant <input type="checkbox"/> c. cooperative agreement <input type="checkbox"/> d. loan <input type="checkbox"/> e. loan guarantee <input type="checkbox"/> f. loan insurance	2. Status of Federal Action: <input type="checkbox"/> a. bid/offer/application <input type="checkbox"/> b. initial award <input type="checkbox"/> c. post-award	3. Report Type: <input type="checkbox"/> a. initial filing <input type="checkbox"/> b. material change For Material Change Only: year _____ quarter _____ date of last report _____
4. Name and Address of Reporting Entity: <input type="checkbox"/> Prime <input type="checkbox"/> Subawardee Tier _____, <i>if known</i> : Congressional District, if known:	5. If Reporting Entity in No. 4 is a Subawardee, Enter Name and Address of Prime: Congressional District, if known:	
6. Federal Department/Agency:	7. Federal Program Name/Description: CFDA Number, <i>if applicable</i> : _____	
8. Federal Action Number, if known:	9. Award Amount, if known: \$ _____	
10. a. Name and Address of Lobbying Registrant <i>(if individual, last name, first name, MI):</i>	b. Individuals Performing Services <i>(including address if different from No. 10a)</i> <i>(last name, first name, MI):</i>	
11. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.	Signature: _____ Print Name: _____ Title: _____ Telephone No.: _____ Date: _____	
Federal Use Only:		Authorized for Local Reproduction Standard Form LLL (Rev. 7-97)

INSTRUCTIONS FOR COMPLETION OF SF-LLL, DISCLOSURE OF LOBBYING ACTIVITIES

This disclosure form shall be completed by the reporting entity, whether subawardee or prime Federal recipient, at the initiation or receipt of a covered Federal action, or a material change to a previous filing, pursuant to title 31 U.S.C. section 1352. The filing of a form is required for each payment or agreement to make payment to any lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a covered Federal action. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identify the type of covered Federal action for which lobbying activity is and/or has been secured to influence the outcome of a covered Federal action.
2. Identify the status of the covered Federal action.
3. Identify the appropriate classification of this report. If this is a followup report caused by a material change to the information previously reported, enter the year and quarter in which the change occurred. Enter the date of the last previously submitted report by this reporting entity for this covered Federal action.
4. Enter the full name, address, city, State and zip code of the reporting entity. Include Congressional District, if known. Check the appropriate classification of the reporting entity that designates if it is, or expects to be, a prime or subaward recipient. Identify the tier of the subawardee, e.g., the first subawardee of the prime is the 1st tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.
5. If the organization filing the report in item 4 checks "Subawardee," then enter the full name, address, city, State and zip code of the prime Federal recipient. Include Congressional District, if known.
6. Enter the name of the Federal agency making the award or loan commitment. Include at least one organizational level below agency name, if known. For example, Department of Transportation, United States Coast Guard.
7. Enter the Federal program name or description for the covered Federal action (item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans, and loan commitments.
8. Enter the most appropriate Federal identifying number available for the Federal action identified in item 1 (e.g., Request for Proposal (RFP) number; Invitation for Bid (IFB) number; grant announcement number; the contract, grant, or loan award number; the application/proposal control number assigned by the Federal agency). Include prefixes, e.g., "RFP-DE-90-001."
9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the Federal amount of the award/loan commitment for the prime entity identified in item 4 or 5.
10. (a) Enter the full name, address, city, State and zip code of the lobbying registrant under the Lobbying Disclosure Act of 1995 engaged by the reporting entity identified in item 4 to influence the covered Federal action.

(b) Enter the full names of the individual(s) performing services, and include full address if different from 10 (a). Enter Last Name, First Name, and Middle Initial (MI).
11. The certifying official shall sign and date the form, print his/her name, title, and telephone number.

According to the Paperwork Reduction Act, as amended, no persons are required to respond to a collection of information unless it displays a valid OMB Control Number. The valid OMB control number for this information collection is OMB No. 0348-0046. Public reporting burden for this collection of information is estimated to average 10 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0046), Washington, DC 20503.

Certification of Payments to Influence Federal Transactions

U.S. Department of Housing and Urban Development
Office of Public and Indian Housing

OMB Approval No. 2577-0157 (Exp. 01/31/2017)

Applicant Name

Program/Activity Receiving Federal Grant Funding

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, Disclosure Form to Report Lobbying, in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all sub recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

I hereby certify that all the information stated herein, as well as any information provided in the accompaniment herewith, is true and accurate.

Warning: HUD will prosecute false claims and statements. Conviction may result in criminal and/or civil penalties. (18 U.S.C. 1001, 1010, 1012; 31 U.S.C. 3729, 3802)

Name of Authorized Official

Title

Signature

Date (mm/dd/yyyy)

ATTACHMENT C
Profile of Firm Form
Company Biography

PROFILE OF FIRM FORM (Page 1 of 2)

(1) Prime Joint Venture/Partner Sub-contractor (This form shall be completed by and for each).

(2) Legal Name of Firm: _____ Telephone: _____ Fax: _____

dba if applicable: _____

(3) Street Address, City, State, Zip: _____

(4) Identify Principals/Partners in Firm

NAME	TITLE	% OF OWNERSHIP

(5) Please indicate the operating structure of your company.

- Publicly Held Corporation
 Privately Held Corporation
 Government Agency
 Non-Profit Organization
 Partnership
 Sole Proprietorship

(6) Bidder's Diversity Statement: You must check all of the following that apply to the ownership of this firm and enter where provided the correct percentage (%) of ownership of each:

{Minority (MBE), or Woman-Owned (WBE) Business Enterprises qualify by virtue of 51% or more ownership and active management in the firm.}

- African American _____%
 Native American _____%
 Hispanic American _____%
 Asian/Pacific American _____%
 Hasidic Jew _____%
 Asian/Indian American _____%

- Woman-Owned (MBE) _____%
 Woman-Owned (Caucasian) _____%
 Disabled Veteran _____%
 Caucasian American (Male) _____%
 Other (Specify): _____%

(7) Is the business 51% or more owned by a public housing resident? Yes No. If yes, provide name and address of the public housing facility:

Facility Name: _____

Facility Address: _____ City: _____

SWMBE Certification Number: _____

Certification Agency: _____

(NOTE: A CERTIFICATION/NUMBER IS NOT REQUIRED – ENTER IF AVAILABLE)

(8) Federal Tax ID Number: _____

(9) City of San Antonio Business License No.: _____

(10) State of Texas License Type and No.: _____

PROFILE OF FIRM FORM (Page 2 of 2)

(11) Has your firm or any member of your firm been a party to litigation with a public entity? If yes, when, with whom and state the circumstances and any resolution.

(12) Has your firm or any member of your firm ever sued or been sued by the San Antonio Housing Authority or its affiliated entities? If yes, when and state the circumstances and any resolution of the lawsuit.

(13) Has your firm or any member of your firm ever had a claim brought against because of breach of contract or nonperformance? If yes, when and state the circumstances and any resolution of the matter.

(14) Debarred Statement: Has this firm, or any principal(s) ever been debarred from providing any services by the Federal Government, any state government, the State of Texas, or any local government agency within or without the State of Texas? Yes No

Initials _____

If "Yes," please attach a full detailed explanation, including dates, circumstances and current status.

(15) Disclosure Statement: Does this firm or any principals thereof have any current, past personal or professional relationship with any Commissioner or Officer of SAHA? Yes No

Initials _____

If "Yes," please attach a full detailed explanation, including dates, circumstances and current status.

(16) Non-Collusive Affidavit: The undersigned party submitting this proposal hereby certifies that such bid is genuine and not collusive and that said Offerer has not colluded, conspired, connived or agreed, directly or indirectly, with any Offerer or person, to put in a sham bid or to refrain from bidding, and has not in any manner, directly or indirectly sought by agreement or collusion, or communication or conference, with any person, to fix the bid price of affiant or of any other Offerer, to fix overhead, profit or cost element of said bid price, or that of any other Offerer or to secure any advantage against the SAHA or any person interested in the proposed contract; and that all statements in said proposal are true.

Initials _____

(17) Verification Statement: The undersigned Offerer hereby states that by completing and submitting this form he/she is verifying that all information provided herein is, to the best of his/her knowledge, true and accurate, and agrees that if the SAHA discovers that any information entered herein is false, that shall entitle the SAHA to not consider nor make award or to cancel any award with the undersigned party.

Initials _____

(18) In performing this contract, the contractor(s) shall comply with any and all applicable federal, state or local laws including but not limited to: Occupational Safety & Health, Equal Employment Opportunity, Immigration and Naturalization, The Americans with Disabilities Act, State Tax and Insurance Law, and the Fair Housing Act.

Initials _____

Signature

Date

Printed Name

Company

Company Biography

Company Name: _____

Headquarters Location: _____

Field Office Locations: _____

Business Specialty or Focus: _____

Number of Full Time Staff: _____

Founding Date and Brief History: _____

Texas Projects and/or Clients: _____

(past & current)

Previous Housing Authority Experience: YES NO

List the Authorities: _____

Proposed Subcontractors

Note: A completed Profile of Firm Form must be submitted for each subcontractor.

Proposed Subcontractors					
Item	Company Name	Address	Phone	Specialty	S/W/M/V BE
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

<p>I understand and agree that if awarded a contract as a result of this solicitation that the use of the above subcontractors is subject to the approval of SAHA and becomes a part of the contract. I further understand that any change in subcontractors also requires the pre-approval of SAHA.</p>	<p>_____</p> <p>(Signature)</p> <p>_____</p> <p>(Printed Name & Title)</p> <p>_____</p> <p>(Company Name)</p>
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ATTACHMENT D
Section 3 and SWMBE Guidelines and Forms

SAN ANTONIO HOUSING AUTHORITY

SECTION 3 PROGRAM

CONTRACTOR COMPLIANCE GUIDE

BACKGROUND

The San Antonio Housing Authority (SAHA) adopted a formal Section 3 program, policy, and procedures on June 2, 2011 (Resolution 5164) to provide the framework for its compliance with Section 3 of the Housing and Urban Development (HUD) Act of 1968 which applies to all employment and economic projects funded in whole or in part by HUD.

Therefore, all prime contractors participating on a HUD-assisted project shall comply with all applicable sections of the SAHA Section 3 Program.

The objective of the SAHA Section 3 Program is to ensure to the greatest extent feasible that employment and other economic-related opportunities are directed to low- and very-low income individuals and businesses owned by such individuals.

SECTION 3 GUIDANCE

1. The SAHA Section 3 Program adopted on June 2, 2011 is hereby incorporated by reference as part of this Interim Section 3 Guidance. Notice is hereby given that it is the responsibility of bidder/proposer or contractor to ensure understanding and compliance with all applicable sections of the Section 3 Program. Bidders/proposers and/or prime contractors are directed to the SAHA website for more information on the Section 3 Program.
2. The Section 3 Program requirements apply to all HUD-assisted projects covered by Section 3 and are therefore applicable to SAHA bidders/proposers and recipients of contracts and subcontracts.
3. In order to achieve the Section 3 Program objectives, numerical goals for training/employment and subcontracting opportunities for Section 3 residents and Business Concerns have been established. The Section 3 goals (below) apply to the entire Section 3 covered project and represent minimum numerical goals set forth in the Section 3 Program. In the absence of evidence to the contrary, a contractor that meets the minimum numerical goals will be considered to have complied with the Section 3 Program requirements. SAHA reserves the right to increase project-specific goals as may be deemed appropriate by the SAHA representatives. Contractors are advised to read each solicitation carefully to determine the applicable goals for compliance. In the event the solicitation changes the goals listed below, Contractor must follow the stricter goals.

Employment: Thirty percent (30%) of new hires per contract should be Section 3 residents.

Contracting: Subcontract ten percent (10%) of the total value of a construction contract with Section 3 Business Concerns.

Professional Services: Subcontract three percent (3%) with Section 3 Business Concerns on non-construction contracts (professional services).

3. In order to ensure the greatest impact on employment, contracting and economic opportunities, SAHA contractors and subcontractors shall direct their efforts to Section 3 residents and Business Concerns on a “preference” tiered basis as follows:

Training/Employment

- a) Category 1: Residents of the housing development or developments for which the Section 3 covered assistance is expended.
- b) Category 2: Residents of the other housing developments managed by the housing authority that is expending the Section 3 covered assistance.
- c) Category 3: Participants in HUD Youthbuild programs being carried out in the metropolitan area in which the Section 3 covered assistance is expended.
- d) Other Section 3 residents.

Contracting Opportunities

- a) Category 1: Business Concerns that are 51 percent or more owned by residents of the housing development or developments for which the Section 3 covered assistance is expended, or whose full-time permanent workforce includes 30 percent of those persons as employees.
- b) Category 2: Business Concerns that are 51 percent or more owned by residents of other housing developments or developments managed by the housing authority that is expending the Section 3 covered assistance, or whose full-time permanent workforce includes 30 percent of those persons as employees.
- c) Category 3: HUD Youthbuild programs being carried out in the metropolitan area (or non-metropolitan county) in which the Section 3 covered assistance is expended.
- d) Category 4: Business concerns that are 51 percent or more owned by Section 3 residents or whose permanent, full-time workforce includes no less than 30 percent Section 3 residents, or that subcontract in excess of 25 percent of the total amount of subcontracts to Category 1 or 2 business concerns identified above.

4. To more effectively apply the Section 3 preferences, the following incentives shall be applicable to Section 3 HUD-assisted projects:

Solicitations Under \$50,000

On solicitations under \$50,000 and where two or more certified Section 3 Business Concerns are available to compete, SAHA will institute a “first source” solicitation initiative whereby two of the three solicited firms must be Section 3 Business Concerns.

Solicitations Greater than \$50,000

On Requests for Proposals the following incentives will be instituted:

- 1) A twenty percent (20%) preference will be instituted for Category 1 Section 3 Business Concerns bidding as prime contractors.
- 2) A fifteen percent (15%) preference will be instituted for Category 2 Section 3 Business Concerns bidding as prime contractors.
- 3) A ten percent (10%) preference will be instituted for Category 3 Section 3 Business Concerns bidding as prime contractors.
- 4) A five percent (5%) preference will be instituted for Category 4 Section 3 Business Concerns bidding as prime contractors.
- 5) A five percent (5%) preference will be provided to SAHA prime contractors that have achieved both the resident hires and business concern contracting goals in their immediate past contract performance within the last year.
- 6) A five percent (5%) preference will be provided to SAHA prime contractors participating in a SAHA approved Joint Venture or Mentor-Protégé program with an eligible Section 3 Business Concern.
- 7) A five percent (5%) preference will be provided to prime contractors that have formal apprenticeship programs approved by DOL and commit to training no less than ten (10) eligible Section 3 residents through such programs annually that provide no less than 250 hours of formal training.

On Invitations for Bids the following preference will be instituted:

- 1). Contractors who are certified as Section 3 Business Concerns and whose prices are within the independent cost estimate of the project and are both responsive and responsible, shall receive a preference according to the following table, where x is the amount by which the Section 3 Business Concern may be above the lowest responsive bid.

 x=lesser of:

When the lowest responsive bid
 is less than \$100,000 10% of that bid or \$9,000.

When the lowest responsive bid is:
 At least \$100,000, but less than \$200,000 9% of that bid, or \$16,000.
 At least \$200,000, but less than \$300,000 8% of that bid, or \$21,000.
 At least \$300,000, but less than \$400,000 7% of that bid, or \$24,000.

At least \$400,000, but less than \$500,000 6% of that bid, or \$25,000.
At least \$500,000, but less than \$1 million 5% of that bid, or \$40,000.
At least \$1 million, but less than \$2 million 4% of that bid, or \$60,000.
At least \$2 million, but less than \$4 million 3% of that bid, or \$80,000.
At least \$4 million, but less than \$7 million 2% of that bid, or \$105,000.
\$7 million or more 1½% of the lowest responsive bid, with no dollar limit.

2) Where two or more Section 3 business concerns are both responsive and responsible, the Section 3 business concern with the lowest price shall receive the contract award.

A successful contractor's usage of the above preferences shall be capped annually at \$1 million dollars in the aggregate. Once a contractor has been awarded annually \$1 million dollars in contracts as a result of a preference, the contractor is no longer eligible for the above preferences for the remainder of the calendar year.

5. Bidders/proposers must either achieve the Section 3 Program employment and subcontracting goals identified above (under number 3) or demonstrate acceptable good faith efforts to achieve the numerical goals in the proposal/bid. SAHA representatives shall review and deem acceptable, in their sole determination, a bidder or proposer's good faith efforts prior to the award of the contract. Please be advised that a contractor Section 3 performance will be considered and evaluated on future SAHA contracts and will be a factor in the selection and/or contract award.
6. To ensure that the SAHA Section 3 Program benefits individuals and businesses that are eligible Section 3 residents and Business Concerns, all Section 3 resident and Business Concerns must be deemed eligible through documentation of a "Section 3 Eligibility Form" for each eligible individual or business. Notice is hereby given that it is the responsibility of the prime contractor to ensure that all participating and eligible Section 3 residents and/or Business Concerns (vendors, suppliers or subcontractors) submit the necessary information for proper SAHA status review and credit.
7. All SAHA prime contractors must submit a Section 3 program compliance report on a monthly basis in the form and content as requested by SAHA staff. This report shall document Section 3 resident and Business Concern training, employment, and subcontracting monthly performance against goals and opportunities.
8. Failure or refusal by a SAHA bidder/proposer or contractor to satisfy or comply with the Section 3 Program requirements, either during the bid/proposal process or during the term of the SAHA agreement, shall constitute a material breach of contract whereupon the contract, at the option of SAHA, may be cancelled, terminated, or suspended in whole or in part; and, the contractor debarred from further contracts with SAHA as a non-responsible contractor. SAHA may at its discretion also declare bids/proposals not complying with the Section 3 Program requirements in whole or in part nonresponsive and eliminate them from consideration of a contract award.

INTERIM PRIME CONTRACTOR COMPLIANCE REQUIREMENTS

Prime contractors participating on SAHA Section 3 HUD-assisted projects are specifically required to address and satisfy the Section 3 Program requirements described below *prior* to the award of the contract. The Section 3 Program requirements shall be applicable throughout the duration of the contract and to any amendment and renewal.

1. In the absence of evidence to the contrary, a prime contractor that meets the minimum Section 3 Program numerical goals set forth in the solicitation will be considered to have complied with the Section 3 Program requirements. A prime contractor who meets this goal must submit with the bid/proposal a “*Good Faith Effort Compliance Plan*” (**Attachment A**) by simply completing Sections A and B which present the project and contractor information and goal commitment information respectfully.
2. In evaluating compliance, a prime contractor that *has not* met the numerical goals set forth in the solicitation has the burden of fully demonstrating its efforts to achieve the Section 3 goals through the submittal and approval of a “*Good Faith Effort Compliance Plan*” (**Attachment A**) to include completion of Sections A, B and C which must be included with the bid/proposal. SAHA representatives shall review and determine in their sole discretion whether a bidder or proposer’s (contractor) good faith effort compliance plan achieves the Section 3 Program goals and objectives. A responsive good faith effort compliance plan shall address all questions in Sections A, B and C and describe the concrete efforts that were taken and will be taken to reach numerical goals in hiring/employment, training, and contracting. The final agreed-upon plan shall become part of the SAHA contract.
3. SAHA reserves the right to disregard bids/proposals as non-responsive bids and proposals which fail to demonstrate a good faith effort towards compliance with the Section 3 Program requirements.
4. As required under the Section 3 Program’s contractual clause, prime contractors specifically agree to include the Section 3 Clause in every subcontract subject to compliance with regulations in 24 CFR Part 135, and agree to take appropriate action, as provided in an applicable provision of the subcontract or in the Section 3 Clause, upon a finding that a subcontractor is in violation of the regulations in 24 CFR Part 135. A prime contractor shall not subcontract with any subcontractor where the bidder/proposer has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR Part 135.
5. Prime contractors shall submit a properly completed and executed “Section 3 Eligibility Form” for all participating Section 3 residents and/or Section 3 Business Concerns (**Attachment B**). It is the responsibility of the prime contractor to ensure that eligible Section 3 residents and Business Concerns submit all necessary information for SAHA review and credit, to include an eligible Section 3 prime contractor, if applicable.

6. Prime contractors requesting a Section 3 Program preference based upon employment or ownership interest shall submit a properly completed and executed Section 3 Eligibility Forms for all employees and owners who qualify, and provide any supporting documentation that may subsequently be required by SAHA. Prime contractors and subcontractors must employ any Section 3 residents full-time for not less than one month prior to the submittal of the bid/proposal in order for the prime contractor to receive credit for employing the Section 3 resident for a preference.
7. Notwithstanding the fact that a prime contractor may have the capability to complete a total project with its own workforce and without the use of subcontractors, all SAHA prime contractors on a HUD-assisted project shall be required to achieve the Section 3 Program numerical goals or demonstrate a good faith effort to achieve those goals within the industry. Should the need arise to hire or subcontract during the term of a contract, the hiring and/or subcontracting goals shall still be applicable and the training component remains in force.
8. All changes to the original list of subcontractors submitted with the bid or proposal shall be submitted for review and approval in accordance with SAHA's procedures when adding, changing, or deleting subcontractors/sub-consultants. Prime contractors are required to make a good faith effort to replace any Section 3 Business Concern with another eligible Section 3 Business Concern. SAHA may deny such requests when it finds that a prime contractor fails to provide acceptable justification or when the effect of such change would dilute a preference received on a HUD-assisted contract.
9. All prime contractors participating on a HUD-assisted project shall submit a Section 3 Performance Report no later than the third business day of the following month detailing Section 3 employment and contracting activity not only for themselves but also all subcontractors on the project. The report is to also detail training and other economic opportunity activities by the prime contractor and subcontractors.

SAN ANTONIO HOUSING AUTHORITY SECTION 3 PROGRAM UTILIZATION PLAN

INSTRUCTION SHEET

Please read these instructions carefully before completing the required *Section 3 Utilization Plan* document. These instructions are designed to assist bidders/proposers document Section 3 Program compliance. or present a detailed explanation why, despite their best efforts the minimum numerical goals were not met. These numerical goals are **minimum** targets that must be reached in order for SAHA to consider a recipient in compliance.

Questions regarding completion of the *Section 3 Utilization Plan* document should be directed to: Section 3 Coordinator, at 210 -477 -6165 or section3@saha.org.

- Bidders/proposers are required to make sincere efforts to achieve the Section 3 Program numerical goals as specified in solicitation documents. A bidders/proposers approved Section 3 Utilization Plan will be monitored throughout the duration of the SAHA contractual term.
- Contractor shall submit a *Section 3 Utilization Plan* at the time of bid/proposal submittal in order to be considered responsive.
- This *Section 3 Utilization Plan* is subject to SAHA's review and approval. SAHA may at its sole discretion approve or disapprove the plan. SAHA's determination is administratively appealable to the CEO and to the Board of Commissioners pursuant to SAHA's Section 3 Program, Policy & Procedures.
- All bidders/proposers are to complete the following:

- _____ **Section A**, Bidder/Proposer Information
- _____ **Section B**, Contractor Commitments - New Hires
- _____ **Section C**, Contractor Commitments - Subcontractors
- _____ **Section D**, Contractor Commitments – Other Economic Opportunities
- _____ **Section E**, Good Faith Efforts
- _____ **Section F**, Section 3 Compliance Certification

Optional:

- _____ Certification for Section 3 Business Concerns
- _____ Section 3 Individual Verification Form (S3-6003b REV 2/2016)

- SAHA requires all Section 3 residents and/or Business Concerns to certify or submit evidence to SAHA, contractor, or subcontractor, that the person or business is Section 3 eligible. SAHA has developed a Certification Process for this purpose. It is the responsibility of the Contractor to submit these forms to the SAHA Section 3 Coordinator at section3@saha.org.

SECTION 3 PROGRAM UTILIZATION PLAN

Project Title: _____

SECTION A – BIDDER/PROPOSER INFORMATION

Name of Firm: _____

Contact Person: _____ Telephone: _____

Email: _____

Is your firm a "Section 3 Business Concern": Yes _____ No _____
 If "Yes"; complete the Certification for Section 3 Business Form and attach the Required Documentation.

SECTION B – CONTRACTOR COMMITMENTS – NEW HIRES (If more space is needed, please provide an attachment).

Hiring Goal: A minimum of Thirty percent (30%) of the aggregate number of new hires shall be Section 3 residents

B.1 Explain how you intend to recruit a minimum of 30% of Section 3 residents for **full-time new hires**, and what actions you will use to require subcontractors to do the same. **Note:** Section 3 individuals must work a minimum of 32 hours per week or 135 hours per month to be considered full-time employees.

B.2 Complete the table below to identify the bidder's/proposer's employee positions required for the execution of this project.

Job Category*	Number of Positions to be Filled with Section 3 Residents	Anticipated wages per hour
Professionals		
Technicians		
Office/Clerical		
Officers/Managers		
Sales		
Craft Workers (Skilled)		
Operatives (Semi-Skilled)		
Laborers (Unskilled)		
Service Workers		
Other List & describe		

B.3 The contractor has committed to employ _____ resident(s) in order to comply with its Section 3 requirements. Indicate the estimated percentage of Section 3 new hires for this project: _____

SECTION C – CONTRACTOR COMMITMENTS – SUBCONTRACTORS (If more space is needed, please provide an attachment).

Contracting Goal: A minimum of ten percent (10%) of all covered **construction** contracts shall be awarded to Section 3 business concerns C. Three percent (3%) of all covered **non-construction** contracts shall be awarded to Section 3 business concerns

C.1 Describe how bids from Section 3 businesses will be solicited for subcontracting.

C.2 Complete the table below to identify the subcontractors/suppliers that will be utilized for the execution of this project.

Subcontractor/Supplier Listing

Subcontractor or Supplier/ Name and Address and phone number	Scope of Work/Product	\$ Value	Certified Section 3 Business Concern (Y/N)

(Make Additional Copies as Necessary)

C.3 The Prime Contractor will subcontract with a total of _____ Section 3 Business Concerns totaling _____% of the Contract Value. **NOTE:** *The contractual opportunity goal is a percentage of the total gross dollar value of the proposed contract awarded to a Section 3 eligible Business Concern. SAHA will only credit participation by Section 3 Business Concerns that submit documentation acceptable to SAHA certifying their Section 3 status.*

**SECTION D – CONTRACTOR COMMITMENTS – OTHER ECONOMIC OPPORTUNITIES
(If more space is needed, please provide an attachment).**

B.3 The undersigned bidder/proposer will satisfy the Section 3 *other economic opportunity* goal:
Yes _____ No _____

Please outline your plan to provide other economic opportunities to Section 3 residents. Examples of plans may include training agreements, internship programs, mentorship programs etc.

SECTION E – GOOD FAITH EFFORTS

NOTE: Fill this section only, if Plan as submitted fails to meet the employment and contractual opportunity goals as stated herein or as amended in the solicitation.

D.1 If no contracting, hiring or other economic opportunities are anticipated, briefly explain why.

SECTION F: SECTION 3 UTILIZATION PLAN CERTIFICATION

I CERTIFY THAT I HAVE REVIEWED AND FULLY UNDERSTAND SAHA'S SECTION 3 PROGRAM AND THE SECTION 3 CLAUSE INCORPORATED BY REFERENCE INTO THIS DOCUMENT. I HEREBY AFFIRM THAT THE INFORMATION SUBMITTED HEREIN IS TRUE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

I HEREBY CERTIFY THAT THE ABOVE TABLES IDENTIFY THE NUMBER OF SECTION 3 BUSINESS CONCERNS THE COMPANY WILL UTILIZE AND THE NUMBER OF SECTION 3 RESIDENTS THE COMPANY PROPOSES TO EMPLOY.

I FURTHER UNDERSTAND AND AGREE THAT, THIS DOCUMENT SHALL BE ATTACHED THERETO AND BECOME A BINDING PART OF THE SAHA CONTRACT.

NAME AND TITLE OF AUTHORIZED OFFICIAL:

SIGNATURE: _____ DATE: _____

San Antonio Housing Authority

Section 3 Individual New Hire Verification Form

NEW HIRES MUST COMPLETE THIS FORM. The Section 3 Program requires that recipients of certain HUD financial assistance, to the greatest extent feasible provide employment, training or education opportunities for low- and very-low income persons in connection with projects and activities in their neighborhood. Completion of this form helps your new employer and SAHA monitor compliance to the Section 3 program and may help in obtaining future business with the Housing Authority. Your information is kept CONFIDENTIAL and will not affect any federal subsidies you currently receive, if any.

CONTACT INFORMATION					
First Name:	Last:	M.I.:	Suffix:		
Residence Address:			City:		
State:	Zip:	County:		Phone:	
Email Address (required):				DOB:	
Date of Hire:		Company Name:			
Job Title:		Type of job:		Full-Time (32+ hours per week)	Part-Time

INCOME DISCLOSURE (CHECK ONE OPTION BELOW)
--

In order to be eligible as a Section 3 individual, your household income must meet the income criteria by household size. Individuals are eligible for Section 3 status if their household income is at or below 80% of Area Median Income in Bexar County during the current calendar year or be a resident of public housing or Section 8.

Option 1: I choose to disclose this information

Choose the number of individuals in your household in the chart below to determine your HUD income limit. The dollar amount below the number you indicate is your HUD income limit.

FY 2018 80% Area Median Income Limits (by Household Size)

Number of persons in household	1	2	3	4	5	6	7	8
80% of Area Median Income (FY 2018 HUD Income Limits)	\$37,450	\$42,800	\$48,150	\$53,450	\$57,750	\$62,050	\$66,300	\$70,600

YOU MUST ANSWER THE FOLLOWING QUESTIONS IF YOU ARE CLAIMING SECTION 3 ELIGIBILITY:

Is your household income at or below the HUD income limit for the current year? **Yes** **No**

If your answer is YES and you reside in Bexar County, you are a Section 3 individual, regardless of public housing status.

Are you a resident of public housing or Section 8? **Yes** **No**

If your answer is YES, you are a Section 3 individual regardless of your income.

Option 2: I choose NOT to disclose this information OR I do not qualify as a Section 3 eligible individual.

CERTIFICATION

By signing, I authorize my employer to release relevant information to the San Antonio Housing Authority (SAHA) for contract compliance purposes. I further affirm that the information on this form is to the best of my knowledge and belief true, correct, and complete.

Signature _____

DATE: _____

M/WBE UTILIZATION STATEMENT
SAN ANTONIO HOUSING AUTHORITY
M/WBE PROGRAM OFFICE

Please read these instructions carefully before completing the required Minority/Women Business Enterprise (M/WBE) Utilization Statement. These instructions are designed to assist prime contractors/consultants document M/WBE program compliance or in preparing the required detailed and complete good faith effort information.

Contractors/Consultants are required to submit detailed documentation when the contract specified M/WBE participation ranges or goals are not met. The SAHA M/WBE Program Manager will review and consider a bidder's or proposer's good faith efforts in assisting SAHA to meet its M/WBE policy and program objectives.

A. Bidders/Proposers are required to make sincere efforts in attempting to achieve the applicable SAHA M/WBE participation ranges or goals. The approved M/WBE participation ranges or goals will be monitored throughout the duration of the project;

B. All bidders/proposers are to complete Section A, Project Identification and Section B, Project M/WBE Utilization, if applicable. Should there be subcontracting/sub consulting opportunities, yet the bidder/proposer *not* achieve the project's applicable M/WBE participation range or goal, the bidder/proposer must complete all other sections of the Statement.

C. This Statement should be prepared by the company's project M/WBE Coordinator or designee. The Statement must be signed and dated by an authorized company official. The Coordinator or designee should have a working knowledge as to the project's subcontracting or sub-consulting and supplier activities (actual and anticipated). This individual shall be a key figure in directing the prime contractor's M/WBE activities.

D. The M/WBE Utilization Statement demonstrating a contractor's good faith efforts is subject to the SAHA M/WBE Program Coordinator's review and approval.

E. SAHA requires all M/WBE firms to be certified as such by an entity acceptable to SAHA for project M/WBE credit.

F. SAHA reserves the right to approve all additions or deletions of subcontractors, subconsultants, and/or major vendors. In the event that an M/WBE subcontractor, subconsultant, and/or major vendor is replaced, the contractor must make a good faith effort to involve and utilize another M/WBE subcontractor, sub consultant, and/or major vendor.

Should you have any questions or need additional information, please contact:

Charles Bode
818 S Flores
Asst. Director of Procurement
charles_bode@saha.org
210-477-6165

FOR SAHA PROCUREMENT DEPARTMENT USE ONLY

Reviewed by: _____

Date: _____

Signature of SAHA Official: _____

Recommendation: Approval: _____ Denial: _____

subject to the SAHA M/WBE Program Manager's review and approval.

M/WBE UTILIZATION STATEMENT
 SAN ANTONIO HOUSING AUTHORITY
 M/WBE PROGRAM OFFICE

SECTION A: PROJECT IDENTIFICATION

Project Number _____ Project Title _____

Contract Amount _____ Company Name _____

Project Participation Range/Goal: M/WBE ____ %

Contract Anticipated Participation Range: M/WBE ____ %

The M/WBE participation range/goal is expressed as a percentage of the total dollar amount of the prime contract awarded to M/WBEs. The goal is applicable for those areas, which the prime contractor has subcontracted, sub-consulted, and/or major supplies necessary in the performance of the contract.

SECTION B: SUBCONTRACTOR/SUB CONSULTANT/VENDOR UTILIZATION

1. List all actual *and* anticipated subcontracts, subconsultants, and/or major material purchases, include *both* M/WBE and non-M/WBE, to be utilized on the project (*use additional sheets if necessary*).

TRADE AREA	ESTIMATED AMOUNT (\$)	SUB/SUPPLIER	SUB/SUPPLIER	
			M/WBE	Yes (✓) No

2. MBE utilization in total dollars: _____ WBE utilization in total dollars: _____

3. Overall MBE utilization percentage (%): _____

4. Overall WBE utilization percentage (%): _____

5. Overall M/WBE utilization percentage (%): _____

6. Anticipated M/WBE utilization on this contract will occur:

Throughout ___ Beginning 1/3 ___ Middle 1/3 ___ Final 1/3 ___

Please Note: SAHA will credit only those M/WBEs that have been certified by an entity acceptable to SAHA. All changes, additions, or deletions occurring during the life of this contract relative to use of the listed subcontractors, sub-consultants and/or

major suppliers, M/WBE or otherwise, must be submitted to SAHA for review and approval.

If Bidder/Proposer is unable to meet the M/WBE participation range/goal, please proceed to complete Section C and submit documentation demonstrating contractual good faith efforts.

SECTION C: GOOD FAITH EFFORT

The following items are minimally considered as good faith efforts and demonstrate specific initiatives made in attempting to achieve SAHA’s M/W/BE participation ranges. The bidder/proposer is not limited to these particular areas and may include other efforts deemed appropriate. Please feel free to elaborate on any question below.

Required Questions	Yes	No
1. If applicable, was your company represented at the pre-bid conference?		
2. Did your company request and obtain a copy of the certified M/WBE firms?		
3. Were M/WBE firms solicited for contract participation?		
4. Provide listing of solicited M/WBEs with whom contact was made? Please identify name of company, contact person, date, phone number and briefly describe nature of solicitation. (Include as an Attachment)		
5. Was direct contact made with SAHA’s M/WBE Program Office? If yes, please identify date/person contacted and assistance sought. (Include as an Attachment)		
6. Identify all M/WBE support agencies/associations contacted for M/WBE assistance or solicitation (Minority Chamber’s of Commerce, purchasing councils, contractor groups, etc.). (Please attach copies of solicitation letters of assistance and/or describe, as an Attachment to this section, the personal contact made)		
7. Were bid opportunities related to this project advertised in minority/women newspapers and trade journals? (If yes, please include a copy of the advertisement or detail the name of the publication(s), date of advertisement and describe the solicitation)		
8. Were copies of plans and specification furnished to any M/WBEs?		
9. Were subcontractors, subconsultants, and/or suppliers (if applicable) required to provide insurance or be bonded? (If yes, please detail any assistance that was provided or if they were referred, to whom)		
10. List, as an Attachment, all M/WBE bids received but rejected. Identify company name, contact person, telephone number, date, trade area, and the reason for rejecting the bid/proposal.		
11. Discuss any other effort(s) aimed at involving M/WBEs (Include as an Attachment) : (a) Identify any specific efforts to divide work, in accordance with normal industry practices, to allow maximum M/WBE participation.		

(b) Discuss joint ventures initiatives, requesting second-tier M/WBE subcontracting, etc., if any.		
(c) List all other good faith efforts employed, please elaborate.		

The undersigned acknowledges and states that all information submitted as part of this Good Faith Effort Statement is true and correct to the best of his/her knowledge. I further agree that this document shall be attached thereto and become a binding part of the SAHA contract.

Print Name

Title Date

Signature

Telephone Number

ATTACHMENT E

Wage Decision

General Decision Number: TX190231 01/04/2019 TX231
 Superseded General Decision Number: TX20180280

State: Texas Construction Type: Building County: Bexar 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	Rates	Fringes
	0	01/04/2019		
ASBE0087-014 01/01/2018			Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR (Duct, Pipe and Mechanical System Insulation).....			\$ 22.72	10.02

BOIL0074-003 01/01/2017			Rates	Fringes
BOILERMAKER.....			\$ 28.00	22.35

ELEC0060-003 06/01/2016			Rates	Fringes
ELECTRICIAN (Communication Technician Only).....			\$ 21.57	9%+4.65

ELEC0060-004 06/01/2018			Rates	Fringes
ELECTRICIAN (Excludes Low Voltage Wiring).....			\$ 28.30	13%+5.05

ELEV0081-001 01/01/2018			Rates	Fringes
ELEVATOR MECHANIC.....			\$ 39.32	32.645+a+b
FOOTNOTES:				
A. 6% under 5 years based on regular hourly rate for all hours worked. 8% over 5 years based on regular hourly rate for all hours worked.				
B. Holidays: New Year's Day; Memorial Day; Independence Day; Labor Day; Thanksgiving Day; Friday after Thanksgiving Day; Christmas Day; and Veterans Day.				

ENGI0450-002 04/01/2014			Rates	Fringes
POWER EQUIPMENT OPERATOR Cranes.....			\$ 34.85	9.85

Invitation For Bids (IFB)
INVITATION FOR BIDS (IFB) NO. 1901-910-23-4878 Villa Tranchese Fire Protection Improvements

* IRON0066-013 09/01/2018	Rates	Fringes
IRONWORKER, STRUCTURAL.....	\$ 22.05	6.73

* IRON0084-011 06/01/2018	Rates	Fringes
IRONWORKER, ORNAMENTAL.....	\$ 23.77	7.12

PLUM0142-009 07/01/2017	Rates	Fringes
HVAC MECHANIC (HVAC Electrical Temperature Control Installation Only).....	\$ 30.25	11.80
HVAC MECHANIC (HVAC Unit Installation Only).....	\$ 30.25	11.80
PIPEFITTER (Including HVAC Pipe Installation).....	\$ 30.25	11.80
PLUMBER (Excludes HVAC Pipe Installation).....	\$ 30.25	11.80

SFTX0669-002 04/01/2017	Rates	Fringes
SPRINKLER FITTER (Fire Sprinklers).....	\$ 29.03	15.84

SHEE0067-004 04/01/2018	Rates	Fringes
Sheet metal worker excludes HVAC Duct Installation.....	\$ 26.35	15.29
HVAC Duct Installation Only.....	\$ 26.10	15.25

SUTX2014-006 07/21/2014	Rates	Fringes
BRICKLAYER.....	\$ 22.15	0.00
CARPENTER (Acoustical Ceiling Installation Only).....	\$ 17.83	0.00
CARPENTER (Form Work Only).....	\$ 13.63	0.00
CARPENTER, Excludes Acoustical Ceiling Installation, Drywall Hanging, Form Work, and Metal Stud Installation..	\$ 16.86	4.17
CAULKER.....	\$ 15.00	0.00
CEMENT MASON/CONCRETE FINISHER.....	\$ 22.27	5.30
DRYWALL FINISHER/TAPER.....	\$ 13.81	0.00
DRYWALL HANGER AND METAL STUD INSTALLER.....	\$ 15.18	0.00
ELECTRICIAN (Low Voltage Wiring Only).....	\$ 20.39	3.04
IRONWORKER, REINFORCING.....	\$ 12.27	0.00
LABORER: Common or General.....	\$ 10.75	0.00
LABORER: Mason Tender - Brick.....	\$ 11.88	0.00
LABORER: Mason Tender - Cement/Concrete.....	\$ 12.00	0.00
LABORER: Pipelayer.....	\$ 11.00	0.00
LABORER: Roof Tearoff.....	\$ 11.28	0.00
LABORER: Landscape and Irrigation.....	\$ 8.00	0.00
OPERATOR: Backhoe/Excavator/Trackhoe.....	\$ 15.98	0.00
OPERATOR: Bobcat/Skid Steer/Skid Loader.....	\$ 14.00	0.00
OPERATOR: Bulldozer.....	\$ 14.00	0.00
OPERATOR: Drill.....	\$ 14.50	0.00
OPERATOR: Forklift.....	\$ 12.50	0.00
OPERATOR: Grader/Blade.....	\$ 23.00	5.07
OPERATOR: Loader.....	\$ 12.79	0.00
OPERATOR: Mechanic.....	\$ 18.75	5.12
OPERATOR: Paver (Asphalt, Aggregate, and Concrete)..	\$ 16.03	0.00
OPERATOR: Roller.....	\$ 12.00	0.00
PAINTER (Brush, Roller and Spray), Excludes Drywall Finishing/Taping.....	\$ 13.07	0.00
ROOFER.....	\$ 12.00	0.00
TILE FINISHER.....	\$ 11.32	0.00

TILE SETTER.....	\$ 14.94	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.
=====

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

ATTACHMENT F
Form of Bid
Bid Fee Sheet
Bidder's Certification

FORM OF BID

(This Form must be fully completed and placed under Tab #1 of the bid submittal.)

INSTRUCTIONS: The items listed below must be completed and included in the bid unless otherwise specifically noted. Please complete this form by marking X, where provided, to indicate that the referenced information has been included. Also, complete the Section 3 Statement and the Bidder’s Statement noted on the subsequent page:

X=ITEM INCLUDED	SUBMITTAL ITEMS
_____	Tab 1 Form of Bid (Attachment F)
_____	Tab 2 HUD Forms & Conflict of Interest Questionnaire(Attachment B)
_____	Tab 3 Profile of Firm Form, Company Profile (Attachment C)
_____	Tab 4 Client Information
_____	Tab 5 Joint Venture/Partnership Information
_____	Tab 6 Subcontractor Information
_____	Tab 7 Section 3 Preference
_____	Tab 8 S/W/MBE Small Business Plan
_____	Tab 9 Section 3 Good Faith Effort Compliance Plan
_____	Tab 10 Financial Viability and Other Information

SECTION 3 STATEMENT

Are you claiming a Section 3 business preference? YES___ or NO___. If “YES,” pursuant to the documentation justifying such submitted under Tab No. 8, which category are you claiming?

- _____ Category I – Owned by a public housing resident where work is performed
- _____ Category II – Owned by any other public housing resident
- _____ Category III – HUD Youth Build Program
- _____ Category IV – 30% of workforce is Section 3 qualified or subcontract greater than 25% of contract value to certified Section 3 Business Concern

Bid Fee Sheet

page 1 of 1

The undersigned proposer hereby states that by completing and submitting this Form and all other documents within this submittal, he/she is verifying that all information provided herein is, to the best of his/her knowledge, true and accurate, and that if SAHA discovers that any information entered herein to be false, that shall entitle SAHA to not consider or make award or to cancel any award with the undersigned party. Further, by completing and submitting the submittal, and by entering the costs where provided, the undersigned is thereby agreeing to abide by all terms and conditions pertaining to this IFB as issued by SAHA, in hard copy. Pursuant to all IFB Documents, all attachments, and all completed Documents submitted by proposer, including these forms, addendums, and all attachments, the undersigned proposes to supply SAHA with the services described herein for the fee(s) entered within the areas provided.

Description	Cost
Villa Tranchese Fire Protection Improvements as specified	\$

Delivery in _____ days: (Failure to enter a delivery time will subject bidder to completion in 300 days. Days are defined as calendar days.)

Addenda Acknowledgements

Addendum #1 _____ Date _____

Addendum #2 _____ Date _____

_____ Signature	_____ Date
_____ Printed Name	_____ Company
_____ E-mail address if available	
_____ Phone	_____ Fax

Bidder's Certification

By signing below, Bidder certifies that the following statements are true and correct:

1. He/she has full authority to bind Bidder and that no member Bidder's organization is disbarred, suspended or otherwise prohibited from contracting with any federal, state or local agency,
2. Items for which Bids were provided herein will be delivered as specified in the Bid,
3. In performing this contract, the contractor(s) shall comply with any and all applicable federal, state or local laws including but not limited to: Occupational Safety & Health, Equal Employment Opportunity, Immigration and Naturalization, The Americans with Disabilities Act, State Tax and Insurance Law, and the Fair Housing Act.,
4. Bidder agrees that this bid shall remain open and valid for at least a period of 90 days from the date of the Bid Opening and that this bid shall constitute an offer, which, if accepted by SAHA and subject to the terms and conditions of such acceptance, shall result in a contract between SAHA and the undersigned Bidder,
5. He/she has not given, offered to give, nor intends to give at any time hereafter any economic opportunity, future employment, gift, loan, gratuity, special discount, trip, favor, or service to a public servant in connection with this Bid,
6. Bidder, nor the firm, corporation, partnership, or institution represented by the Bidder, or anyone acting for such firm, corporation or institution has violated the antitrust laws of the State of Texas or the Federal Antitrust laws, nor communicated directly or indirectly the bid made to any competitor or any other person engaged in such line of business,
7. Bidder has not received compensation for participation in the preparation of the specifications for this IFB,
8. **Non-Collusive Affidavit:** The undersigned party submitting this bid hereby certifies that such bid is genuine and not collusive and that said Bidder has not colluded, conspired, connived or agreed, directly or indirectly, with any Bidder or person, to put in a sham Bid or to refrain from bidding, and has not in any manner, directly or indirectly sought by agreement or collusion, or communication or conference, with any person, to fix the bid price of affiant or of any other Bidder, to fix overhead, profit or cost element of said bid price, or that of any other Bidder or to secure any advantage against SAHA or any person interested in the proposed contract; and that all statements in said bid are true.
9. **Child Support:** Pursuant to Section 231.006 (d) of the Texas Family Code, regarding child support, the bidder certifies that the individual or business entity named in this bid is not ineligible to receive the specified payment and acknowledges that this contract may be terminated and payment may be withheld if this certification is inaccurate.
10. **Lobbying Prohibition:** The Contractor agrees to comply with Section 1352 of Title 31, United States Code which prohibits the use of Federal appropriated funds to pay any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, and officer or employee of Congress, or an employee of a Member of Congress in connection with any of the following covered Federal actions: the awarding of any Federal contract; the making of any Federal grant; the making of any Federal loan; the entering into of any cooperative agreement; or the modification of any Federal contract, grant, loan, or cooperative agreement.
11. **Non-Boycott of Israel:** SAHA may not enter into a contract with a company for goods and services unless the contract contains a written verification from the company that; (i) it does not Boycott Israel; and (ii) will not Boycott Israel during the term of the contract. (Texas Government Code chapter 2270) by accepting these General Conditions and any associated contract, the CONTRACTOR certifies that it does not Boycott Israel, and agrees that during the term of this contract will not Boycott Israel as that term is defined in the Texas Government Code Section 808.001, as amended.
12. **Tx. Gov. Code 2252.152:** Prohibits a government entity from awarding a contract to a company identified as Iran, Sudan, or a Foreign Terrorist Organization as identified on a list maintained by the Texas Comptroller of Public Accounts. By signature hereon bidder certifies that it is not affiliated in any manner with the businesses on this list.

SIGNED: _____

(Print Name)

(Print Company Name)

(Company Phone)

(Fax)

(Email Address)

(Date)