

INVITATION TO BID "ITB"

Notice is hereby given that the **LIBERTY PUBLIC SCHOOL DISTRICT, LIBERTY, MISSOURI,** requests written, sealed bids on the items specified on the attached sheet(s).

DATE: NOVEMBER 28, 2023

BID NUMBER: ITB 006-024

BID TITLE: LIFT STATION PUMP REPLACEMENT

BIDS MUST: be received on WEDNESDAY, DECEMBER 13, 2023 at 2:00 PM CST

BIDS MUST BE DELIVERED TO: Jason Breit, Director of Purchasing Liberty Public School District 53 Support Service Center Purchasing Department 801 Kent St. Liberty, MO 64068

All questions, requests for information or clarification pertaining to this bid must be submitted in writing to Jason Breit at jason.breit@lps53.org

The District reserves the right to accept or reject all or any part of any quote/proposal/bid, to waive technicalities, and to accept the offer that the District considers to be the most advantageous.

All supporting bid documents such as addenda, tabulation sheets, notices of action and/or notices of award will be posted on the website the District's website at <u>https://www.lps53.org/Page/1563</u>. It is the responsibility of the bidder to monitor the website for all information regarding this bid or any upcoming bids/proposals.

BID IDENTIFICATION LABEL

NOTICE TO ALL RESPONDENTS

For your convenience, the label below has been provided to properly identify your proposal submittal. Place your bid in a sealed envelope, type or print company name and address in area provided below and affix the label on the outer surface of the envelope or package.

PLEASE FILL OUT THE LABEL BELOW AND ATTACH IT TO THE OUTSIDE OF YOUR REPLY ENVELOPE.

BID	DO NOT OPEN - SEALED BID - DO NOT OPEN #: ITB 006-024, TITLE: LIFT STATION PUMP REPLACEMENT BID PROPOSAL DUE ON: <u>DECEMBER 13, 2023 at 2:00 PM CST</u>	
FROM:		
DELIVER TO:	LIBERTY PUBLIC SCHOOL DISTRICT PURCHASING DEPARTMENT ATTN: JASON BREIT 801 KENT ST. LIBERTY, MO 64068	

BID INSTRUCTIONS

PURPOSE

The purpose of this ITB is to establish an agreement between Liberty Public School District and awarded contractor for the complete replacement of the sewage ejector pumps and associated work, as described herein, at Liberty North High School. This is a "turn key" project and will be awarded to a single contractor to complete every aspect of this work.

CALENDAR OF EVENTS

Tuesday, November 28, 2023 Wednesday, December 6, 2023 Friday, December 8, 2023 Wednesday, December 13, 2023 Tuesday, December 19, 2023 Wednesday, December 20, 2023 Bid Release Date Pre-Bid Meeting – 2:30 PM CST Question Deadline – 3:00 PM CST Submittal of Bid Deadline - 2:00 PM CST BOE Recommendation for Award Vendor Award Notification

PRE-BID MEETING

A pre-bid meeting will be held at Liberty North High School on Wednesday, December 6, 2023 at 2:30 PM CST. Liberty North High School is located at 1000 NE 104th St, Liberty, MO. 64068. The meeting will initially be held in the front admin office at this location and then a site walk will be conducted following Q&A. See map below. The point of contact for the meeting is Justin Presson, Project Manager, who can be reached at 816-736-5448. It is highly recommended that all perspective vendors attend the pre-bid meeting in order to fully understand the scope of service being requested.

Liberty North High School – 1000 NE 104th St, Liberty, MO 64068.



CLARIFICATION DEADLINE

The Vendor is presumed to completely accept the Bid requirements as stated herein. Bidders having questions concerning ITB terminology, general or specific conditions should submit them in writing to the Director of Purchasing at jason.breit@lps53.org.

The Vendor must raise any questions regarding the Bid requirements no later than December 8, 2023 at 3:00 <u>PM CST</u> so that appropriate information may be researched and made available prior to the bid opening.

By submitting a bid, the bidder warrants that he/she is fully satisfied that these specifications, as amended if applicable, accurately describe or indicate that all conditions, site or otherwise, have been taken into account in determining the bid price(s). There will be no increase in the contract price based upon a bidder's misunderstanding or lack of knowledge about the intent of the solicitation. In addition, the vendor must list and outline, in their bid response, any exceptions to the Bid requirements. The timeliness, nature and number of the exceptions taken by the Vendor are among the factors that the District will consider in selecting the successful Vendor.

BONDING

A **Payment Bond** will be required from any vendor that submits a total bid proposal in excess of \$50,000. The undersigned Bidder agrees to furnish a Payment Bond in the amount of 100% of the total contract value prior to execution of the formal service contract, agreement or issuance of an official district purchase order.

A Bid Bond and/or Performance Bond is NOT required to be submitted on this project.

SPECIAL REQUIREMENTS

One original proposal clearly marked "**Original**", and two (2) copies, clearly marked "**Copy**", must be submitted. Please also include a digital/electronic copy on a flash drive within your proposal packet. The complete Bid Response should be sealed in an envelope or box for delivery to the Purchasing Office of Liberty Public Schools. "Copy" documents must be identical to Original Response submitted. The Liberty School District will not be held responsible for pricing sheets or materials left out of "Copy" or "Original" submittals.

The District may occasionally submit more than one separately numbered proposal packet to you in a single envelope. Please be aware that you must return separately numbered proposals to the District in separate envelopes. Multiple options within the same proposal may, however, be submitted together.

ADDENDA

All changes, additions, and/or clarifications in connection with this Bid will be issued by the Purchasing Office in the form of a written addendum. Signed acknowledgement of receipt of each addendum must be submitted with the Bid (see "Bid Response Form"). Verbal responses and/or representations shall not be binding.

BID CONTENTS AND SUBMISSION

Bids shall include the following information:

- A. Name, address, and telephone number of Bidder(s). See page 2.
- B. Full price for providing the Product, Equipment and/or Service in accordance with this Bid.
- C. A completed Bid Form attached to this Invitation for Bid.
- D. Name, address and telephone number of not less than two (2) references for whom the Vendor has provided similar Supplies, Equipment, and/or Services to within the last 2 years.
- E. Detailed description of material and services to be provided.

Vendors must use the forms provided for the purpose of submitting quotes and must give the unit price, extend totals, and sign the quote as required in each specific instance. If the vendor does not care to quote, we request that forms be returned and the reason noted. Provide all specifications and descriptive literature.

EVALUATION

In evaluating any aspect of the Response, the District may consider previous dealings with the Vendor, references from the Vendor's customers, inspections of other Supplies, Equipment or Services provided by the Vendor, and any other information the District obtains regarding the Vendor, or that the District deems relevant.

- 1. Responsive responses from Vendors will be evaluated on the basis of criteria that include the following:
 - a. Overall cost to the District, whether direct or indirect.
 - b. Delivery and/or lead-time required for receipt of goods/services.
 - c. Completed required forms and ability to meet the requirements of the attached service contract.
- 2. The timeliness, nature and number of any exceptions taken by the Vendor to the Bid will be considered by the District in evaluating a Response. Any one of these criteria alone, or in combination, may provide a basis for not accepting the Vendor's Response.
- 3. A responsible vendor is one who, in the opinion of the District, possesses the skill, experience, ability, integrity, financial and other resources necessary for providing the supplies, equipment, and/or services. In evaluating a Vendor's responsibility, or in evaluating any other aspect of the Response, the District may consider previous dealing with the District, references from the Vendor's customers, inspections of other supplies, equipment, and/or services supplied by the vendor, and may other information the District obtains regarding the Vendor or that the District deems relevant.

SUPPLEMENTAL MATERIALS

Vendors are responsible for including all pertinent product data in the returned proposal package. Literature, brochures, data sheets, specification information, completed forms requested as part of the proposal package and any other facts which may affect the evaluation and subsequent contract award should be included.

Materials such as legal documents and contractual agreements, which the vendor wishes to include as a condition of the proposal, must also be in the returned bid package. Failure to include all necessary and proper supplemental materials may be cause to reject the entire proposal.

TIME OF COMPLETION

Work shall begin on or about March 17, 2024. Work shall be substantially complete, excluding additional projects added to the original scope of work, by April 1, 2024. This timeframe represents Spring Break for the Liberty Public School District.

BID EXPIRATION

All bids shall be considered as firm for a period of sixty (60) calendar days, commencing the date and time of the bid closing and expiring at 3:00 PM CST of the last day. **Please note on the any deviations to this requirement.**

DISTRICT OPTION

- A. Select more than one successful Bidder based on price break(s).
- B. During the term of this Bid, the District reserves the right to purchase, from the accepted Bidder, additional products, equipment or services at the herein proposed Bid price.
- C. The District does not guarantee that any minimum quantity will be purchased from the successful Bidder during the term of this Bid.

BID OPENING

The proposal/bid contents and any modifications shall be returned in a sealed envelope addressed to the Purchasing Department, Support Services Center, 801 Kent St, Liberty, MO, 64068. <u>The Bid number and Bid Opening date</u> shall be shown on the face of the envelope, and must be labeled with the vendor's name. Bids may be modified if sent in a sealed envelope, marked "Revised Bid", and be in the possession of the Purchasing Director by the Bid opening date and time. All prospective Bidders will utilize the attached Bid Form. Bids will be publicly opened and read aloud on the date and time specified herein at the Support Services Center, 801 Kent St, Liberty, MO 64068.

Any bid proposal(s) delivered prior to the bid proposal due date must be delivered between the operational hours of 8:00 AM and 3:00 PM CST, Monday through Friday. This excludes major holidays. This is to ensure that Purchasing Department staff is on hand an available to accept bid proposal prior to the official due date and time.

BID REJECTION

The District reserves the right to accept or reject all or any part of any quote, to waive technicalities, and to accept the offer that the District considers to be the most advantageous.

ACCEPTANCE OF BIDS:

The District reserves the right to accept the Bid that, in its judgment, is the lowest and/or best Bid. The delivery date(s) or dates when work will start shall be stated in definite terms, as they will be taken into consideration when making the award.

LATE BIDS

Bids received after the date and time of the Bid opening stated herein shall not be considered and will be returned unopened.

MISTAKE IN BIDS

If the respondent discovers a mistake in Bid prior to the date and time specified for the Bid opening, he or she may correct the mistake by modifying or withdrawing the Bid. If the apparent low and best Bidder discovers a mistake in Bid of a serious and significant nature which is unfavorable to him or her prior to the issuance of a purchase order or a contract, he or she may request consideration be given to modifying the Bid if he or she remains the lowest Bidder or to withdrawing the Bid if the result of the correction of the mistake makes another Bidder lowest and best Bidder. The mistake must be evident and provable. A mistake in Bid cannot be considered once a purchase order or contract is issued.

NEGOTIATION

- A. The District reserves the right to award a contract based on the initial Responses received, without engaging in discussions or negotiations. Accordingly, a Vendor should submit its initial Bid on the most favorable terms possible to the District. However, should only one Bid be received by the District, the District may, but is not obligated to, conduct negotiations with this vendor whose Response, in the opinion of the District, is competitive or may best meet the needs of the District.
- B. The District may, but is not obligated to, seek clarification of a Response submitted by a Vendor.
- C. If the District chooses to negotiate, negotiation may involve any issue bearing on the Response and may take place after submission of Response and before an award is made. The District reserves the right to follow negotiations with a request for submission of a best and final Response.

AWARD OF THE CONTRACT

After the Bids have been opened and duly considered, the lowest, most responsive and, responsible bid will be submitted to the Liberty Public School District 53 Board of Education for formal approval. After approval by the District Board of Education, the Purchasing Director will notify, in writing, the successful Bidder. An approved Bid award by the Board of Education shall constitute the District's official award of the Bid. A written contract, or purchase order, noting the terms and conditions of this bid will be executed before "Notice to Proceed" is given. **Vendors with standardized contracts should submit them with the Bid Response.**

PREVAILING WAGE PROJECT

This is a prevailing wage solicitation. Not less than the prevailing hourly rate of wages, as set out in the wage order attached to and made part of the specification for work under the contract, shall be paid to all workers performing under this contract. (Section 290.250, RSMo).

The contractor will be held responsible for paying the prevailing wages and it is imperative that all contractors familiarize themselves with the current wage rates before submitting bids based on these specifications herein. The contractor will forfeit a penalty to the contracting public body of \$100 per day (or a portion of a day) for each worker that is paid less than the prevailing rate for any work done under the contract by the contractor or any subcontractors (Section 290.250, RSMo). The Contractor and all subcontractors to the contract must require all on-site employees to complete the ten-hour safety training program required under Section 292.675, RSMo, unless they have previously completed the program and have documentation of having done so.

The contractor will forfeit a penalty to the contracting public body of \$2500 plus an additional \$100 for each employee employed by the contractor or subcontractor, for each calendar day, or portion thereof, such employee is employed without the required training (Section 292.675, RSMo).

A legible list of all prevailing wage rates must remain posted in a prominent and easily accessible place at the worksite by each contractor and subcontractor on the project. The notice must be posted during the full time that any worker is employed on the job (Section 290.265, RSMo).

During periods of excessive employment (any month immediately following two consecutive calendar months during which the level of unemployment in the state has exceeded five percent as measured by the United States Bureau of Labor Statistics) only Missouri laborers (persons who have resided in Missouri for at least thirty days and intend to become or remain Missouri residents) and laborers from non-restrictive states persons who are residents of a state which has not enacted state laws restricting Missouri laborers from working on public works projects in that state, (as determined by the Labor and industrial Relations Commission) may be employed under the contract, except that other laborers may be used when Missouri laborers from non-restrictive states are not available, or are incapable of performing the particular type of work involved, if so certified by the contractor and approved by the contracting officer.

Every transient employer, as defined in section 285.230 RSMo, enclosed in the laws section, must post in a prominent and easily accessible place at work site a clearly legible copy of the following: (1) The notice of registration for employer withholding issued to such transient employer by the director of revenue; (2) Proof of coverage for workers' compensation insurance or self-insurance signed by the transient employer and verified by the department of revenue through records of the division of workers' compensation; and (3) The notice of registration for unemployment insurance issued to such transient employer by the division of employment security. Any transient employer failing to comply with these requirements shall, under section 285.234 RSMo, enclosed in the laws section, be liable for a penalty of five hundred dollars per day until the notices required by this section are posted as required by that statute.

The awarded contractor must provide certified payroll for themselves and any sub-contractors throughout the duration of work and prior to final payment being made (290.290, RSMo).

At the completion of this project and prior to a final payment being made, the contractor must submit an "Affidavit of Compliance" for PW-4 with the Liberty Public School District. The affidavit must state the party has fully complied with Missouri Prevailing Wage Law, and the public body must verify that the correct wages were paid. No payment can be legally made by the public body to the contractor(s) until the affidavit is filed in proper form and order with the public body (Section 290.290 and 290.325, RSMo).

All contractors must report to the Liberty Public School District if a wage subsidy, bid supplement, or rebate was provided, and if so, if it was provided lawfully. The amount and date of each subsidy, supplement or rebate must be reported to the Liberty Public School District within 30 days of receipt of payment (Section 290.095, RSMo).

Missouri Prevailing Wage Order for this Project – Wage Order No. 30 (See Enclosed)

REFERENCES

Please provide references of entities that your company has provided services to and that the district may contact for reference.

Reference # 1	
Organization Name:	Telephone #:
Contact Name:	Email:
Scope of Work Provided:	
Project Dollar Value:	Contract Dates:
Reference # 2	
	T 1 1 <i>"</i>
Organization Name:	Telephone #:
Contact Name:	Email:
Scope of Work Provided:	
Project Dollar Value:	Contract Dates:
Reference # 3	
Organization Name:	Telephone #:
Contact Name:	Email:
Scope of Work Provided:	
Project Dollar Value:	Contract Dates:

SERVICE CONTRACT

Below is the formal service contract, which includes all governing terms and conditions, that shall be dually executed between the District and awarded Vendor upon formal award of service by the District Board of Education. All materials such as legal documents and contractual agreements, which the vendor wishes to include as a condition of the proposal, must also be included within the returned proposal package for review by District.



SERVICES CONTRACT

Between

LIBERTY PUBLIC SCHOOL DISTRICT #53

and

CONTRACTOR

Contract No.

THIS CONTRACT SHALL BE BINDING ON THE DISTRICT ONLY IF IT IS APPROVED BY THE BOARD OF EDUCATION AND SIGNED BY AN AUTHORIZED REPRESENTATIVE OF THE DISTRICT

This Services Contract ("Contract") is made by and between the Liberty Public School District #53, Liberty, MO 64068 ("LPS" or "Liberty Schools") and CONTRACTOR ("Contractor"). The parties agree as follows:

CONTRACTOR DATA

Contractor Name:		
Contact Name:		
Address:		
City, State, ZIP:		
Telephone:	Email:	
Contractor must submit a contract. Payment informapplicable, provided by (a completed "Request for Taxpaye mation will be reported to the Int Contractor. Contractor certifies u	r Identification Number and Certification" (Form W-9) with this signed ernal Revenue Services under the name and TIN or SSN, whichever in nder penalty of perjury that Contractor is a
Sole Proprietor	Corporation	Limited Liability Company
Partnership	Nonprofit Corporation	Other (describe:)
District Point of Conta	act:	
Name of Building or De	epartment:	
Address:		

*All information in this contract is subject to public records law. Please contact the District Point of Contact listed above if you have any questions.

TERMS AND CONDITIONS

- 1. **Purpose.** This contract is for services other than (a) personal services or (b) architecture, engineering, or related services.
- 2. Term and Termination. This contract becomes effective on ______ or the date on which the Contract is fully executed by both parties, whichever is later. No party shall perform work under this Contract before the effective date. An email notification with a copy of the fully executed contract will be sent to the Contractor email listed above upon execution. At that time, work under the contract may begin.

Unless earlier terminated as provided below, this Contract shall continue through

Check if applicable:

_____ As provided for in _______ (enter RFP/ITB/QUOTES solicitation number, e.g. RFP 010-018), this Contract may be renewed for up to _______ (e.g. four additional one-year terms) by amendment signed by both parties.

3. Cooperative Purchasing Option. At the discretion of the Contractor and pursuant to District policy, purchasing procedures, other public agencies may purchase the awarded goods and services from the awarded Contractor)s), under terms and conditions of this contract.

Any such purchases will be between the Contractor and the participating public agency under separate contract and will not impact the Contractor's obligations to the District. Any estimated purchase volumes listed in this Contract do not include other public agencies and the District makes no guarantee as to their participation.

- 4. Detailed Description of Services/Statement of Work. Contractor shall provide the services described in Exhibit A (Statement of Work).
- 5. Contract Documents. This Contract consists of these Terms and Conditions and the documents listed below in descending order of precedence. A conflict in these documents shall be resolved in the priority listed below with these Terms and Conditions taking precedence over all other documents. The Exhibits to this Contract include the following documents.
 - o Exhibit A (Statement of Work)
 - Exhibit B (Felony Conviction Notification Form)
 - Exhibit C (Federal Work Authorization Program Affidavit Form)
 - o Exhibit D (Federal Work Authorization Program ("E-Verify) Addendum Form)

6. Maximum Total Payment; Invoicing. The maximum total payment under this Contract is \$______; This is a not-to-exceed amount, and the District will not pay more than this amount unless specifically agreed to in an amendment executed by the parties. Contractor shall invoice District, and District shall pay Contractor as described in Exhibit A. In all cases, District reserves the right to withhold payments to Contractor for amounts

P a g e 10 | 22

reasonable and sufficient to (a) cover District's costs in processing invoices more than 60 days late and (b) protect the District from any loss, damage, or claim which may result from Contractor's failure to perform in accordance with the terms of the Contract or failure to make proper payment to suppliers or subcontractors.

7. Other Payment Issues.

- a. <u>Method of Payment:</u> Unless otherwise specified in Exhibit A, District shall pay Contractor net 30 days upon invoice approval and work acceptance.
- b. <u>Payment on Early Termination</u>: Upon termination pursuant to Section 15 (Early Termination), District shall pay Contractor as follows:
 - i. If District terminates this Contract for its convenience under Section 15 (a) or 15 (b), then District must pay Contractor for work performed before the termination date if and only if Contractor performed in accordance with this Contract. District shall not be liable for any direct, indirect, or consequential damages. Termination by District shall not constitute a waiver of any other claim District may have against Contractor.
 - ii. If Contractor terminates this Contract under Section 15 (c) or 15 (d) due to Contractor's breach, then District must pay Contractor for work performed before the termination date if and only if Contractor performed in accordance with this Contract.
 - iii. If District terminates this Contract under Sections 15 (c) or 15 (d) due to Contractor's breach, then District must pay Contractor for work performed before the termination date less any setoff to which District is entitled and if and only if Contractor performed such work in accordance with this Contract.
- c. <u>Non-Appropriation: Adequate Funding:</u> District is prohibited from contracting for services for which it has not received appropriated funds. If payment for work under this Contract extends into District's next fiscal year, District's obligation to pay for such work shall be subject to approval for future School Board appropriations to fund this Contract. Moreover, continuation of this Contract at specified levels is specifically conditioned on adequate funding under the District's budget adopted in June of each year. District reserves the right to adjust the level of services provided for in this Contract in accordance with the funding levels adopted by its Board of Education.
- 8. Cost Adjustments. Both parties agree that contracted prices shall be fixed for the first 12 months of this Contract. Contractor must submit to District any proposed cost adjustments at least 60 days before the proposed effective date of such increases with a detailed explanation for each adjustment. District reserves the right to reject any changes to this Contract it deems unacceptable.
- **9. Independent Contractor Status:** By its signature on this contract, Contractor certifies that the service or services to be performed under this Contract are those of an independent contractor. And that Contractor is solely responsible for the work performed under this Contract. Contractor represents and warrants that Contractor, its subcontractors, employees, and agents are not "officers, agents, or employees" of the District.
- 10. Subcontracts and Assignment. Contractor shall not subcontract, assign, delegate, or transfer any of its duties, rights, or interests under this Contract without the prior written consent of District. District may withhold such consent for any or no reason. If District consents to an assignment or subcontract, then in addition to any other provisions of this Contract, Contractor shall require any permitted subcontractor to be bound by all the terms and

conditions of this Contract that would otherwise bind Contractor. The parties agree that any such subcontracts shall be construed as matters solely between Contractor and its subcontractor and shall not have any binding effect on District.

- **11. Successors in Interest.** This Contract shall bind and insure to the benefit of the parties, their successors, and approved assigns, if any.
- 12. No Third Party Beneficiaries. District and Contractor are the only parties to this Contract and are the only parties entitled to enforce its terms. Nothing in this Contract gives or provides any benefit or right, directly or indirectly, to third parties unless they are individually identified by name in this Contract and expressly described as intended beneficiaries of this Contract.
- 13. Other Contractors. If this Contract is for "services" and not "services requirements" (see Section 1 (Purpose)) District may enter into other contracts for additional or related work, and Contractor shall fully cooperate and coordinate its performance under the Contract with those other contractors and with relevant District employees. Contractor shall not commit or permit any act that will interfere with the performance of work by any other contractor or by District employees.
- 14. Nonperformance; Substituted Services. As used in this Contract, "failure to perform" means failure (for whatever reason) to deliver the services as specified and/or scheduled in this Contract. If Contractor fails to perform under this Contract and does not cure that failure within seven days' written notice from District, then District has the right to complete the services itself, to obtain the services from other sources, or to a combination thereof as necessary to accomplish the purpose of this Contract. Both parties agree that Contractor shall bear any reasonable cost difference for these substituted services.
- **15.** Early Termination. This Contract may be terminated as follows unless specified herein:
 - a. <u>Mutual:</u> District and Contractor may terminate this Contract at any time by their written agreement.
 - b. <u>District's Sole Discretion</u>: District in its sole discretion may terminate this Contract for any reason on 30 days' written notice to Contractor.
 - c. <u>Breach</u>: Either party may terminate this Contract in the event of a breach by the other party. To be effective, the party seeking termination must give to the other party written notice of the breach and its intent to terminate. If the breaching party does not entirely cure the breach within 15 days of the date of the notice, then the non-breaching party may terminate this Contract at any time thereafter by giving a written notice of termination.
 - d. <u>Contractor Licensing, etc.</u>: Notwithstanding Section 15 (c), District may terminate this Contract immediately by written notice to Contractor upon denial, suspension, revocation, or non-renewal of any license, permit, or certificate that Contractor must hold to provide services under this Contract.
 - e. <u>Furlough:</u> District reserves the right to terminate or otherwise suspend this Contract if District's Board of Education determines that funding is insufficient to remain fully open and calls for a District-wide furlough or similar temporary District reduction in operations. Any temporary closure shall not affect amounts due Contractors under the Contract, subject to a pro-rated adjustment for reduction in services or need for goods during the furlough.

- 16. Remedies. In case of Contractor breach and in addition to the provisions of Section 13 and 14 of this Contract, the parties agree that District is entitled to any other available legal and equitable remedies. In case of District breach, the parties agree that Contractor's remedy is limited to Contract termination and receipt of Contract payments to which Contractor is entitled.
- 17. Hazardous Materials. Contractor shall notify District before using any products containing hazardous materials to which District employees, students, or the general public may be exposed. Upon District request, Contractor must immediately provide Material Safety Data Sheets to District for all Materials subject to this provision.
- **18. Errors.** Contractor shall perform any additional work necessary to correct Contractor errors in the services it performs. Under this Contract and shall do so without undue delays or additional cost to District.
- 19. Access to Records; Contractor Financial Records. Contractor agrees that District and its authorizes representatives are entitled to review all Contractor books, documents, papers, plans, and records, electronic or otherwise ("Records"), directly pertinent to this Contract for the purpose of making audit, examination, excerpts, and transcripts. Contractor shall maintain all Records, fiscal and otherwise, directly relating to this Contract in accordance with generally accepted accounting principles so as to document clearly Contractor's performance. Following final payment and termination of this Contract, Contractor shall retain and keep accessible all Records for a minimum of three years, or such longer period as may be required by law, or until the conclusion of any audit, controversy, or litigation arising out of or related to this Contract, whichever date is later.
- 20. Ownership of Work Products. Contractor agrees that all work product created or developed for District by Contractor pursuant to this Contract are intended as :work made for hire" and shall be the exclusive property of the District. If any such work product contains Contractor's intellectual property that is or could be protected by federal copyright, patent, or trademark laws, Contractor hereby grants District a perpetual, royalty-free, fully-paid, non-exclusive, and irrevocable license to copy, reproduce, deliver, publish, perform, dispose of, and use or re-use, in whole or in part, and to authorize others to do so, all such work product. District claims no right to any pre-existing work product of Contractor provided to District by the Contractor in the performance of this Contract, except to copy, use, or re-use any such work product for District use only.

21. Work performed on District Property. Contractor shall comply with the following:

- a. <u>Identification</u>: When performing work on District property, Contractor shall be in appropriate work attire (or uniform, if applicable) at all times. If Contractor does not have a specific uniform, then Contractor shall provide identification tags and/or any other mechanism the District in its sole discretion determines is required to easily identify Contractor.
- b. <u>Sign-In Required</u>: As required by schools and other District locations, each day Contractor's employee are present on District property, those employees must sign into the location's main office to receive an in-school identification/visitors tag. Contractor's employees must display this tag on their person at all times while on District property.
- c. <u>No Smoking</u>: All District properties are tobacco-free zones; Contractor is prohibited from using any tobacco product on District property.

- d. <u>No Drugs:</u> All District properties are drug-free zones as enforced by law enforcement.
- e. <u>No Weapons or Firearms</u>: Except as provided by statute and District policy, all District properties are weapons and firearms-free zones; Contractor is prohibited from possessing on its persons or in its vehicles any weapons or firearms while on District property.
- 22. Security. Any disclosure or removal of any District matter or property by Contractor shall be cause for immediate termination of this Contract. Contractor shall bear sole responsibility for any liability including, but not limited to attorney fees, resulting from any action or suit brought against District because of Contractor's willful or negligent release of information, documents, or property contained in or on District property.
- 23. Employee Removal. At District's request, Contractor shall immediately remove any Contractor employee from all District properties in cases where the District in its sole discretion determines that removal of that employee is in the District's best interests.
- 24. Media Contacts. Contractor shall issue no news release, press release, or other statement to members of the news media or any other publication regarding this Contract or the Services provided hereunder within one (1) year of Services completion without District's prior written authorization. Contractor shall not post or publish any textual or visual representations of the Services without approval of District.
- **30.** Compliance with Applicable Law. Contractor shall comply with all federal, state, and local laws applicable to public contracts and the work done under this Contract, and with all regulations and administrative rules established pursuant to those laws.
- **31. Indemnification.** Contractor shall defend and indemnify District, its officers, directors, employees, and agents from and against all liabilities, losses, expenses, claims, actions, or judgements (including attorney fees) recovered or made against District for any damage, injury, or death to persons or damage to property caused by the negligent or intentional acts or omissions of Contractor, its officers, employees, agents, or subcontractors related to Contractor's performance under this Contract. District must promptly notify Contractor in writing of any such claim or demand to indemnify and shall cooperate with Contractor in a reasonable manner to defend such claim.
- **32. Insurance.** At all times while providing services under this Contract, Contractor shall maintain in force at Contractor's expense the following insurance coverage(s), as applicable:
 - a. <u>Workers' Compensation</u>. As required by Chapter 287 of the Revised Statutes of Missouri, subject employers shall provide workers' compensation coverage in accordance with this law. Contractors shall submit a certificate of insurance to District showing proof of coverage.
 - b. <u>Professional Liability/Errors & Omissions (E&O)</u>. If Contractor is providing services that require a state license (including, but not limited to, accounting, architectural, auditing, legal, and medical), then Contractor shall maintain professional liability/E&O insurance coverage of at least 3,000,000 for each claimant, and at least \$3,000,000 coverage for each incident or occurrence.

- c. <u>General Liability</u>. Contractor shall provide general liability insurance coverage to sufficiently cover events adverse to the objectives of this Contract. Contractor shall maintain general liability insurance coverage of at least \$1,000,000 for each claimant and \$3,000,000 for each incident, or occurrence.
- d. <u>Motor Vehicle Liability</u>. If Contractor is providing services that require Contractor to transport District personnel, students, or property, then in addition to any legally required insurance coverage, Contractor shall maintain motor vehicle liability insurance of at least \$1,000,000 for each claimant, and \$3,000,000 for each incident, or occurrence.
- e. <u>Other Insurance</u>. District reserves the right to require other insurance (e.g. Builder's All –Risk Insurance for construction services) as may be reasonably prudent under this Contract.
- f. <u>Additional Requirements</u>. All insurance coverage shall be provided by an insurance company having an A.M. Best rating of at least A- and licensed to do business in Missouri. Contractor alone is responsible for paying all deductibles and retentions. Contractor's coverage shall be primary in the event of loss.
- g. <u>Certificate of Insurance</u>. Upon District request, Contractor shall furnish to District a current certificate of insurance for each of the above coverages within 48 hours of District request. Each certificate must state the relevant deductible or retention level. For general liability coverage, the certificate must state that District, its agents, officers, and employees are additional insureds with respect to Contractor's services provided under this Contract. The certificate must specify an additional insured endorsement, and Contractor shall attached a copy of the endorsement to the certificate. If requested by District, Contractor shall also provide complete copies of insurance policies to District.
- **33. Waiver; Severability**. Waiver of any default or breach under this Contract by District does not constitute a waiver of any subsequent default or a modification of any other provisions of this Contract. If any term or provision of this Contract is declared by a court of competent jurisdiction to be illegal or in conflict with any law, the validity of the remaining terms and provisions shall not be affected, and the rights and obligations of the parties shall be construed and enforced as if the Contract did not contain the particular term or provision held invalid.
- **34.** Non-discrimination Clause. Both parties agree that no person shall be subject to unlawful discrimination based on race; national or ethnic orgin; color; sex; religion; age; sexual orientation; gender expression or identify; pregnancy; marital status; familial status; economic status or source of income; mental or physical disability or perceived disability; or military service in programs, activities, services, benefits, or employment in connection with this Contract. The parties further agree not to discriminate in their employment or personnel policies.
- **35. Confidentiality.** Contractor agrees that all knowledge and information that it may receive from the Liberty Public School District or its employees, agents or consultants or by virtue of the performance of services under and pursuant to this agreement including but not limited to information concerning the students and employees of LPS shall for all time and for all purposes be regarded by Contractor as confidential and held by Contractor in confidence and shall be solely for the benefit and use of LPS and shall not be used by Contractor or directly or indirectly disclosed by Contractor to any person or entity whatsoever excepting LPS or with the written permission of LPS or when required by law.
- **36. Controlling Law; Venue.** The parties agree that Missouri law will govern any dispute related to this Contract and to conduct any litigation arising out of this Contract in courts located in Clay County, Missouri.

- **37. Amendments; Renewal.** Any amendments, consents to or waivers of the terms of this Contract must be in writing and signed by both parties. The parties may renew this Contract by their signed, written instrument.
- **38. Counterparts.** The parties may execute this Contract in counterparts, each of which constitutes an original and all of which comprise one and the same Contract. Counterparts may be delivered by electronic means.
- **39.** Entire Agreement. When signed by both parties, this Contract (and any attached exhibits) is their final and entire agreement. As their final and entire expression, this Contract supersedes all prior and contemporaneous oral or written communications between the parties, their agents, and representatives. There are no representations, promises, terms, conditions, or obligations other than those contained herein.
- **40.** Notices. All notices or demands delivered upon depositing the notice or demand in the United States mail, certified or registered, postage prepaid, addressed to the respective party at the addresses herein.

PAYMENT METHOD: The District preferred method of payment is by check. Electronic payment is not available at

this time. The district will issue an official purchase order once the Contract has been executed. All invoices should state the applicable purchase order number in order to expedite payment.

I have read this contract and its attached exhibits, if any. I certify that I have the authority to sign and enter into this contract on behalf of the party I represent and agree to be bound by its terms.

CONTRACTOR

DISTRICT

CONTRACTOR

LIBERTY PUBLIC SCHOOL DSITRICT 8 VICTORY LANE LIBERTY, MO 64068

Steve Anderson Chief Operations Officer

Contractor Printed Name and Title

Date

Date

Signature

ATTACHMENT (A) - STATEMENT OF WORK

Either a Statement of Work by Vendor, the Bid Response Form, or a copy of the entire bid proposal submitted by the awarded vendor will be included in the Service Contract as Attachment A.

ATTACHMENT (B) - FELONY CONVICTION NOTIFICATION FORM

The person or business entity that enters into an agreement with this school district must give advance notice to the District if the person or an owner or operator of the business entity has been convicted of a felony. The notice must include a general description of the conduct resulting in the conviction of a felony.

The district may terminate this agreement with a person or business entity if the District determines that the person or business entity failed to give notice by the next preceding subsection, or misrepresented the conduct resulting in the conviction. The District will compensate the person or business entity for services performed before the termination of the agreement".

By submitting this offer and signing this certificate, this bidder:

- Certifies that the owner/operator has not been convicted of a felony, except as indicated on a separate attachment to this offer, and
- Certifies that no employee who will enter school buildings or potentially have contact with school children has been convicted of any felony or a misdemeanor involving violence or sexual contact or sexual abuse. It shall be the duty of the vendor to conduct the appropriate background checks on its employees and vendor agrees to share this information with the District upon request.

Vendor Name:	
Vendor Address:	
Vendor E-mail Address:	
Vendor Telephone:	
Authorized Company Official's Name:	(Printed)
Signature of Company Official:	

Date: _____

ATTACHMENT (C) - FEDERAL WORK AUTHORIZATION PROGRAM AFFIDAVIT

I, _____, being of legal age and having been duly sworn upon my oath, state the following

facts are true:

- 1. I am more than twenty-one years of age; and have first-hand knowledge of the matters set forth herein.
- 2. I am employed by _____ (hereinafter "Company") and have authority to issue this affidavit on its behalf.
- 3. Company is enrolled in and participating in the United States E-Verify (formerly known as "Basic Pilot") federal work authorization program with respect to Company's employees working in connection with the services Company is providing to, or will provide to, the District, to the extent allowed by E-Verify.
- 4. Company does not knowingly employ any person who is an unauthorized alien in connection with the services the Company is providing to, or will provide to, the District.

FURTHER AFFIANT SAYETH NOT.

By: _____ (individual signature)

For _____ (company name)

Title:

Subscribed and sworn to before me on this _____ day of _____, 202___.

NOTARY PUBLIC

My commission expires:

ATTACHMENT (D) – FEDERAL WORK AUTHORIZATION PROGRAM ("E-VERIFY") ADDENDUM

Pursuant to Missouri Revised Statute 285.530, all business entities awarded any contract in excess of five thousand dollars (\$5,000) with a Missouri public school district must, as a condition to the award of any such contract, be enrolled and participate in a federal work authorization program with respect to the employees working in connection with the contracted services being provided, or to be provided, to the District (to the extent allowed by E-Verify). In addition, the business entity must affirm the same through sworn affidavit and provision of documentation. In addition, the business entity must sign an affidavit that it does not knowingly employ any person who is an unauthorized alien in connection with the services being provided, or to be provided, to the District.

Accordingly, your company:

- a) agrees to have an authorized person execute the attached "Federal Work Authorization Program Affidavit" attached hereto as Exhibit A and deliver the same to the District prior to or contemporaneously with the execution of its contract with the District;
- affirms it is enrolled in the "E-Verify" (formerly known as "Basic Pilot") work authorization program of the United States, and are participating in E-Verify with respect to your employees working in connection with the services being provided (to the extent allowed by E-Verify), or to be provided, by your company to the District;
- c) affirms that it is not knowingly employing any person who is an unauthorized alien in connection with the services being provided, or to be provided, by your company to the District;
- affirms you will notify the District if you cease participation in E-Verify, or if there is any action, claim or complaint made against you alleging any violation of Missouri Revised Statute 285.530, or any regulations issued thereto;
- e) agrees to provide documentation of your participation in E-Verify to the District prior to or contemporaneously with the execution of its contract with the District (or at any time thereafter upon request by the District), by providing to the District an E-Verify screen print-out (or equivalent documentation) confirming your participation in E-Verify;
- f) agrees to comply with any state or federal regulations or rules that may be issued subsequent to this addendum that relate to Missouri Revised Statute 285.530; and
- g) agrees that any failure by your company to abide by the requirements a) through f) above will be considered a material breach of your contract with the District.

By: ______(signature)

Printed Name and Title:

For and on behalf of: _____ (company name)

BID RESPONSE FORM

Owner:	Liberty Public School District
Project:	Lift Station Pump Replacement
Project Manager:	Liberty Public School District, Justin Presson
Purchasing:	Liberty Public School District, Jason Breit

Liberty Public School District is bidding this work as a "turn key" project and will be awarded to a single contractor to complete every aspect of performing services to replace the lift station at Liberty North High School.

Name of Bidder: _____

ITB No.: ITB 006-024 Bid Package Title: Lift Station Pump Replacement

Bid Proposal Amounts:

The undersigned, having examined the Bidding Documents and the site of the proposed Work and being familiar with all the conditions affecting the construction of the proposed Project, hereby proposes and agrees to provide and furnish all labor, material, equipment, supervision and other items necessary to perform and complete, in a workmanlike manner, all Work required by the Contract Documents for the Bid Package Scope(s) of Work identified, at the prices stated below. Stated sums include all profit, overhead, fees, insurance, payroll taxes, payment and performance bonds, and all other charges applicable to materials, equipment, labor and all charges that may levied. This Bid excludes sales tax.

In the following proposals, the amounts shall be shown in both words and figures. In the case of discrepancy between the words and the figures, the words shall govern.

Addenda:

The Bidder hereby acknowledges receipt and inclusion in the Bid Proposal the following addendum (number and date):

Addendum No	Dated	Addendum No	Dated
Addendum No	Dated	Addendum No	Dated

Base Bid: _____(\$____).

PLEASE NOTE: THIS PROJECT IS A PUBLIC PROJECT GOVERNED BY COMPETITIVE BIDDING REQUIREMENTS. THIS BID FORM CANNOT BE MODIFIED, QUALIFIED OR DEVIDATED FROM. TO DO SO COULD RESULT IN YOUR BID BEING REJECTED AS NONRESPONSIVE.

Project Duration(s):

ът

The undersigned further states that he is a duly licensed Contractor, for the type of work proposed, in the State of Missouri, and that all fees, permits, etc., pursuant to the submission of this proposal have been paid in full.

Company Name					
Address		City	State	Zip Code	
Telephone	E	-mail Address			
Name (Printed)					
Signature of Authorized	Representative:				
Date	Company Type	: (i.e. Corporation, LLC	C. or Other)		

EXHIBIT A

SCOPE OF WORK

Liberty Public Schools is bidding this scope of work as a "turn key" project and will be awarded to a single contractor to complete every aspect of replacing the sewage ejector pumps and associated work at Liberty North High School.

Scope of work includes all work associated with the following but not limited to:

DIVISION 22 - PLUMBING SPECIFICATION

- 220010 GENERAL PLUMBING REQUIREMENTS
- 220015 COORDINATION
- 220500 COMMON WORK RESULTS FOR PLUMBING
- 220513 COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT
- 220515 BASIC PIPING MATERIALS AND METHODS
- 221300 SANITARY DRAINAGE & VENT PIPING & SPECIALTIES
- 221329 SANITARY SEWAGE PUMPS

DIVISION 26 - ELECTRICAL SPECIFICATION

- 260010 GENERAL ELECTRICAL REQUIREMENTS
- 260500 COMMON WORK RESULTS FOR ELECTRICAL
- 260502 EQUIPMENT WIRING SYSTEMS
- 260519 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
- 260533 RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS
- 260553 IDENTIFICATION FOR ELECTRICAL SYSTEMS

By initialing below, the vendor submitting a proposal acknowledges their understanding of the required scope of work associated and covered within each division listed above.

Bidder Acknowledgement	(Please initial):	Date:
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TABLE OF CONTENTS

DIVISION 22 - PLUMBING SPECIFICATION

- 220010 GENERAL PLUMBING REQUIREMENTS
- 220015 COORDINATION
- 220500 COMMON WORK RESULTS FOR PLUMBING
- 220513 COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT
- 220515 BASIC PIPING MATERIALS AND METHODS
- 221300 SANITARY DRAINAGE & VENT PIPING & SPECIALTIES
- 221329 SANITARY SEWERAGE PUMPS

END OF DIVISION 22 TABLE OF CONTENTS

TABLE OF CONTENTS

DIVISION 26 - ELECTRICAL SPECIFICATION

- 260010 GENERAL ELECTRICAL REQUIREMENTS
- 260500 COMMON WORK RESULTS FOR ELECTRICAL
- 260502 EQUIPMENT WIRING SYSTEMS
- 260519 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
- 260533 RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS
- 260553 IDENTIFICATION FOR ELECTRICAL SYSTEMS

END OF DIVISION 26 TABLE OF CONTENTS

SECTION 220010

GENERAL PLUMBING REQUIREMENTS

PART 1 - GENERAL REQUIREMENTS

1.1 DESCRIPTION OF WORK

- A. This Division requires the furnishing and installing of complete functioning systems, and each element thereof, as specified or indicated on the Drawings and Specifications or reasonably inferred; including every article, device or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system's functioning as indicated by the design and the equipment specified. Elements of the work include materials, labor, supervision, supplies, equipment, transportation, and utilities.
- B. Division 22 of the Specifications and Drawings numbered with prefixes P, MP and EP, or MEP generally describe these systems, but the scope of the Plumbing work includes all such work indicated in the Contract Documents: Instructions to Bidders; Proposal Form; General Conditions; Supplementary General Conditions; Architectural, Structural, Mechanical, Plumbing and Electrical Drawings and Specifications; and Addenda.
- C. The Drawings have been prepared diagrammatically intended to convey the scope of work, indicating the intended general arrangement of the equipment, fixtures, piping, etc. without showing all the exact details as to elevations, offsets, control lines, and other installation requirements. The Contractor shall use the Drawings as a guide when laying out the work and shall verify that materials and equipment will fit into the designated spaces, and which, when installed per manufacturers requirements, will ensure a complete, coordinated, satisfactory and properly operating system.

1.2 QUALITY ASSURANCE

- A. All work under this division shall be executed in a thorough professional manner by competent and experienced workmen licensed to perform the Work specified.
- B. All work shall be installed in strict conformance with manufacturer's requirements, recommendations, and installation instructions. Equipment and materials shall be installed in a neat and professional manner and shall be aligned, leveled, and adjusted for satisfactory operation.
- C. Material and equipment shall be new, shall be of the best quality and design, shall be current model of the manufacturer, shall be free from defects and imperfections and shall have markings or a nameplate identifying the manufacturer and providing sufficient reference to establish quality, size and capacity. Material and equipment of the same type shall be made by the same manufacturer whenever practicable.
- D. Unless specified otherwise, manufactured items shall have been installed and used, without modification, renovation, or repair for not less than one year prior to date of bidding for this project.

1.3 CODES, REFERENCES AND STANDARDS

- A. Execute Work in accordance with the National Fire Protection Association and all Local, State, and National codes, ordinances and regulations in force governing the particular class of Work involved. Obtain timely inspections by the constituted authorities, and upon final completion of the Work obtain and deliver to the Owner executed final certificates of acceptance from the Authority Having Jurisdiction.
- B. Any conflict between these Specifications and accompanying Drawings and the applicable Local, State and Federal codes, ordinances and regulations shall be reported to the Architect in sufficient time, prior to the opening of Bids, to prepare the Supplementary Drawings and Specification Addenda required to resolve the conflict.
- C. The governing codes are minimum requirements. Where these Drawings and Specifications exceed the code requirements, these Drawings and Specification shall prevail.
- D. All material, manufacturing methods, handling, dimensions, method or installation and test procedure shall conform to but not be limited to the following industry standards and codes:

IBC IMC IPC IECC ADA AMCA ANSI AHRI	International Building Code International Mechanical Code International Plumbing Code International Energy Conservation Code American Disabilities Act Air Movement and Control Association, Inc. American National Standards Institute Airc Conditioning, Heating and Refrigeration Institute
ASHRAE	American Society of Heating Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASSE	American Society of Sanitary Engineering
ASTM	American Society of Testing Materials
AWS	American Welding Society
AWWA	American Water Works Association
CISPI	Cast Iron Soil Pipe Institute
ETL	Electrical Testing Laboratories
FGI	Facilities Guideline Institute
HI	Hydraulic Institute
MSS	Manufacturer's Standardization Society of the Valve and Fitting Industry
NBFU	National Board of Fire Underwriters
NEC	National Electrical Code
NFPA	National Fire Protection Association
NEMA	National Electrical Manufactures' Association
OSHA	Occupational Safety and Health Act
PDI	Plumbing and Drainage Institute
UL	Underwriter's Laboratories

- E. Contractor shall comply with rules and regulations of public utilities and municipal departments affected by connections of services.
- F. All Plumbing work shall be performed in compliance with applicable safety regulations, including OSHA regulations. Safety lights, guards, shoring and warning signs required for the performance of the Plumbing work shall be provided by the Contractor.

1.4 DEFINITIONS

- A. General:
 - 1. Furnish: When 'furnish', 'install', 'perform', or 'provide' is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.
 - 2. Install: The term "install" is used to describe operations at the project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations."
 - 3. Provide: The term "provide" means "to furnish and install, complete and ready for the intended use." When 'furnish', 'install', 'perform', or 'provide' is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.
 - 4. Furnished by Owner or Furnished by Others: The item will be furnished by the Owner or Others. It is to be installed and connected under the requirements of this Division, complete and ready for operation, including items incidental to the Work, including services necessary for proper installation and operation. The installation shall be included under the guarantee required by this Division.
 - 5. Engineer: Where referenced in this Division, "Engineer" is the Engineer of Record and the Design Professional for the Work under this Division, and is a Consultant to, and an authorized representative of, the Architect, as defined in the General and/or Supplementary Conditions. When used in this Division, it means increased involvement by, and obligations to, the Engineer, in addition to involvement by, and obligations to, the "Architect".

- 6. AHJ: The local code and/or inspection agency (Authority) Having Jurisdiction over the Work.
- 7. NRTL: Nationally Recognized Testing Laboratory, as defined and listed by OSHA in 29 CFR 1910.7 (e.g., UL, ETL, CSA, etc.), and acceptable to the Authority having Jurisdiction (AHJ) over this project. Nationally Recognized Testing Laboratories and standards listed are used only to represent the characteristics required and are not intended to restrict the use of other listed Manufacturers and models that meet the specified criteria.
- 8. Substitution: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor. Substitutions include Value Engineering proposals.
 - a. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - b. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.
- B. The terms "approved equal", "equivalent", or "equal" are used synonymously and shall mean "accepted by or acceptable to the Engineer as equivalent to the item or manufacturer specified". The term "approved" shall mean labeled, listed, or both, by an NRTL, and acceptable to the AHJ over this project.
- C. The following definitions apply to excavation operations:
 - 1. Additional Excavation: Where excavation has reached required subgrade elevations, if unsuitable bearing materials are encountered, continue excavation until suitable bearing materials are reached. The Contract Sum may be adjusted by an appropriate Contract Modification.
 - 2. Bedding: as used in this Section refers to the compacted sand or pea gravel installed in the bottom of a pipe trench to immediately support a pipe and cover a pipe.
 - 3. Subbase: as used in this Section refers to the compacted soil layer used in pavement systems between the subgrade and the pavement base course material.
 - 4. Subgrade: as used in this Section refers to the compacted soil immediately below the slab or pavement system.
 - 5. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction from the Architect.
 - 6. Drainage Fill: as used in this Section refers to gravel installed to assist in the removal of underslab groundwater.
 - 7. Building Fill: as used in this section refers to borrowed fill material of rock 1" and larger used to fill foundation excavations.
- 1.5 COORDINATION
 - A. The Contractor shall visit the site and ascertain the conditions to be encountered while installing the Work under this Division, verify all dimensions and locations before purchasing equipment or commencing work, and make due provision for same in the bid. Failure to comply with this requirement shall not be considered justification for omission, alteration, incorrect or faulty installation of Work under this Division or for additional compensation for Work covered by this Division.
 - B. The Contractor shall refer to Drawings of the other disciplines and to relevant equipment drawings and shop drawings to determine the extent of clear spaces. The Contractor shall make offsets required to clear equipment, beams and other structural members; and to facilitate concealing piping and ductwork in the manner anticipated in the design.
 - C. The Contractor shall confirm and coordinate the final location and routing of all mechanical, electrical, plumbing, fire protection, control and audio-visual systems with all architectural features, structural components, and other trades. The contractor shall locate equipment, components, ductwork, piping, conduit, and related accessories to maintain the desired ceiling heights as indicated on the architectural drawings. The contractor shall inform the architect of any areas where conflicts may prevent the indicated ceiling height from being maintained. The contractor shall not proceed with any installation in such areas until the architect has given written

approval to proceed or has provided modified contract drawings or written instructions to resolve the apparent conflict.

- D. The Contractor shall provide materials with trim which will fit properly the types of ceiling, wall, or floor finishes actually installed.
- E. The Contractor shall maintain a foreman on the jobsite at all times to coordinate his work with other contractors and subcontractors so that various components of the Plumbing systems will be installed at the proper time, will fit the available space, and will allow proper service access to the equipment. Carry on the Work in such a manner that the Work of the other contractors and trades will not be handicapped, hindered, or delayed at any time.
- F. Work of this Division shall progress according to the "Construction Schedule" as established by the Prime Contractor and his subcontractors and as approved by the Architect. Cooperate in establishing these schedules and perform the Work under this Division, in a timely manner in conformance with the construction schedule so as to ensure successful achievement of schedule dates.

1.6 MEASUREMENTS AND LAYOUTS

A. The drawings are schematic in nature, but show the various components of the systems approximately to scale and attempt to indicate how they are to be integrated with other parts of the building. Figured dimensions shall be taken in preference to scale dimensions. Determine exact locations by job measurements, by checking the requirements of other trades, and by reviewing the Contract Documents. The Contractor will be held responsible for errors which could have been avoided by proper checking and inspection.

1.7 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to the requirements of individual Sections. Additionally, prepare coordination drawings as required scope of installation is not completely shown 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 trade.
 - 1. Information shall be project specific and drawn accurately to a scale large enough to resolve conflicts. Do not base coordination drawings on standard dimensional data.
 - 2. Prepare floorplans, sections, elevations, and details as needed to adequately describe relationship of various systems and components.
 - 3. Clearly indicate functional and spatial relationships of components of all systems specified in the Contract Documents, including but not limited to: architectural, structural, civil, mechanical, electrical, fire protection, and specialty systems.
 - 4. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - 5. Show location and size of access doors required for access to concealed equipment, fittings, controls, terminations, and cabling.
 - 6. Indicate required installation sequence to minimize conflicts between entities.
 - 7. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Contract Administrator indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
 - 8. The details of the coordination are the responsibility of the Contractor and, where indicated on the Drawings, minor adjustments in raceway routing, device placement, device type, or equipment arrangement are not to be considered changes to the Contract.
- B. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
 - 1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
 - 2. Where the Engineer's digital data files are provided to the Contractor for use in preparing coordination digital data files, the Engineer makes no representations as to the accuracy or completeness of digital data files as they relate to the Drawings or Specifications.

- 3. Submit coordination drawings in accordance with the submittal procedures outlined within these Specifications.
- 1.8 SUBMITTALS
 - A. Refer to Division 01 and General Conditions for submittal requirements in addition to requirements specified herein.
 - B. Refer to Division 01 for acceptance of electronic submittals. If not specified by Division 01, provide electronic submittals. If Division 01 requires paper submittals, provide the quantity of submittals required, but no fewer than seven (7) sets.
 - C. For electronic submittals, Contractor shall submit the documents in accordance with this Section and the procedures specified in Division 01. Contractor shall notify the Contract Administrator and Engineer that the submittals have been posted. If electronic submittal procedures are not defined in Division 01, Contractor shall include the website, user name and password information needed to access the submittals. For submittals sent by e-mail, Contractor shall copy the Contract Administrator's and Engineer's designated representatives. Contractor shall allow for the Engineer Review Time as specified. Contractor shall submit only the documents required to purchase the materials and/or equipment in the submittal.
 - D. Engineer Review Time: Transmit submittals as early as required to support the project schedule. Allow two weeks for Engineer review plus to/from mailing time via the Contract Administrator, plus a duplication of this time for resubmittal if required. Transmit submittals as soon as possible after Notice to Proceed and before Mechanical construction starts.
 - E. Submittals and shop drawings shall not contain the firm name, logo, seal, or signature of the Engineer. They shall not be copies of the work product of the Engineer. If the Contractor desires to use elements of such product, the license agreement for transfer of information obtained from the Engineer must be used.
 - F. Assemble and submit for review manufacturer product literature for material and equipment to be furnished and/or installed under this Division. Literature shall include shop drawings, manufacturer product data, performance sheets, samples, and other submittals required by this Division as noted in each individual Section. General product catalog data not specifically noted to be part of the specified product will be rejected and returned without review.
 - G. Separate submittals according to individual specification sections. Only resubmit those sections requested for resubmittal.
 - H. Provide submittals in sufficient detail so as to demonstrate compliance with these Contract Documents and the design concept. Highlight, mark, list or indicate the materials, performance criteria and accessories that are being proposed. Illegible submittals will be rejected and returned without review.
 - I. Refer to individual Sections for additional submittal requirements.
 - J. Before transmitting submittals and material lists, verify that the equipment submitted is mutually compatible with and suitable for the intended use. Verify that the equipment will fit the available space and maintain manufacturer recommended service clearances. If the size of equipment furnished makes necessary any change in location, or configuration, submit a shop drawing showing the proposed layout.
 - K. Submittals shall contain the following information:
 - 1. The project name.
 - 2. The applicable specification section and paragraph.
 - 3. Equipment identification acronym as used on the drawings.
 - 4. The submittal date.
 - 5. The Contractor's stamp, which shall certify that the stamped drawings have been checked by the Contractor, comply with the Drawings and Specifications, and have been coordinated with other trades.
 - 6. Submittals not so identified will be returned to the Contractor without action.
 - L. The checking and subsequent acceptance by the Engineer and/or Contract Administrator of submittals shall not relieve responsibility from the Contractor for (1) deviations from Drawings and Specifications; (2) errors in dimensions, details, sizes of equipment, or quantities; (3) omissions

of components or fittings; and (4) not coordinating items with actual building conditions and adjacent work. Contractor shall request and secure written acceptance from the Engineer and Contract Administrator prior to implementing any deviation.

- M. Provide welders' qualification certificates.
- 1.9 ELECTRONIC DRAWING FILES
 - A. In preparation of shop drawings or record drawings, Contractor may, at their option, obtain electronic drawing files in AutoCAD or DXF format from the Engineer. Contact the Architect for Architect's written authorization. Contractor shall request and complete the Electronic File Release Agreement form from the Engineer. Send the form along to Henderson Engineers, Inc. Architect's written authorization and Engineer's release agreement form must be received before electronic drawing files will be sent.

1.10 SUBSTITUTIONS

- A. Refer to Division 01 and General Conditions for substitutions in addition to requirements specified herein.
- B. Materials, products, equipment, and systems described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by the proposed substitution.
- C. The base bid shall include only the products from manufacturers specifically named in the drawings and specifications.
- D. Request for Substitution:
 - 1. Complete and send the Substitution Request Form attached at the end of this section for each material, product, equipment, or system that is proposed to be substituted.
 - 2. The burden of proof of the merit of the proposed substitution is upon the proposer.
 - 3. Unless stated otherwise in writing to the Engineer by the Contractor, Contractor warrants to the Engineer, Architect, and Owner the following:
 - a. Proposed substitution has been fully investigated and determined to meet or exceed the specified Work in all respects.
 - b. Proposed substitution is consistent with the Contract Documents and will produce indicated results, including functional clearances, maintenance service, and sourcing of replacement parts.
 - c. Proposed substitution has received necessary approvals of authorities having jurisdiction.
 - d. Same warranty will be furnished for proposed substitution as for specified Work.
 - e. If accepted substitution fails to perform as required, Contractor shall replace substitute material or system with that originally specified and bear costs incurred thereby.
 - f. Coordination, installation and changes in the Work as necessary for accepted substitution will be complete in all respects.
- E. Substitution Consideration:
 - 1. No substitutions will be considered unless the Substitution Request Form is completed and attached with the appropriate substitution documentation.
 - 2. No substitution will be considered prior to receipt of Bids unless written request for approval to bid has been received by the Engineer at least ten (10) calendar days prior to the date for receipt of Bids.
 - 3. If the proposed substitution is approved prior to receipt of Bids, such approval will be stated in an Addendum. Bidders shall not rely upon approvals made in any other manner. Verbal approval will not be given.
 - 4. No substitutions will be considered after the Contract is awarded unless specifically provided in the Contract Documents.

1.11 OPERATION AND MAINTENANCE MANUALS

A. Refer to Division 01 and General Conditions for Operation and Maintenance Manuals in addition to requirements specified herein.

- B. Submit manuals prior to requesting the final punch list and before all requests for Substantial Completion.
- C. Instruct the Owner's permanent personnel in the proper operation of, startup and shutdown procedures and maintenance of the equipment and components of the systems installed under this Division.
- D. Prior to Substantial Completion of the project, furnish to the Architect, for Engineer's review, and for the Owner's use, four (4) copies of Operation and Maintenance Manuals in labeled, hard-back three-ring binders, with cover, binding label, tabbed dividers and plastic insert folders for Record Drawings. Include local contacts, complete with address and telephone number, for equipment, apparatus, and system components furnished and installed under this Division of the specifications.
- Each manual shall contain data listed in Table 5. E.
- F. Refer to Division 01 for acceptance of electronic manuals for this project. For electronic manuals, Contractor shall submit the documents in accordance with this Section and the procedures specified in Division 01. Contractor shall notify the Architect and Engineer that the manuals have been posted. If electronic manual procedures are not defined in Division 01. Contractor shall include the website, user name and password information needed to access the manuals. For manuals sent by e-mail, Contractor shall copy the Architect and Engineer's designated representatives.

1.12 RECORD DRAWINGS

- A. Refer to Division 01 and General Conditions for Record Drawings in addition to requirements specified herein.
- B. A set of work prints of the Contract Documents shall be kept on the jobsite during construction for the purpose of noting changes. During the course of construction, the Contractor shall indicate on these Documents changes made from the original Contract Documents. Particular attention shall be paid to those items which need to be located for servicing. Underground utilities shall be located by dimension, from column lines.
- C. At the completion of the project, the Contractor shall obtain, at their expense, reproducible copies of the final drawings and incorporate changes noted on the jobsite work prints onto these drawings. These changes shall be done by a skilled drafter. Each sheet shall be marked "Record Drawing", along with the date. These drawings shall be delivered to the Architect/Engineer.

1.13 TRAINING

A. Provide training as indicated in each specific section. Schedule training with the Owner at least 7 days in advance. Video tape the training sessions in format as agreed to with the Owner. Provide three copies of each session to the Owner and obtain written receipt from the Owner.

1.14 DELIVERY, STORAGE AND HANDLING

- Refer to Division 01 and General Conditions for Delivery, Storage and Handling in addition to Α requirements specified herein.
- Equipment and material shall be delivered to the job site in their original containers with labels В. intact, fully identified with manufacturer's name, model, model number, type, size, capacity and Underwriter's Laboratories, Inc. labels and other pertinent information necessary to identify the item.
- C. Deliver, receive, handle and store equipment and materials at the job site in the designated area and in such a manner as to prevent equipment and materials from damage and loss. Store equipment and materials delivered to the site on pallets and cover with waterproof, tear resistant tarp or plastic or as required to keep equipment and materials dry. Follow manufacturer's recommendations, and at all times, take every precaution to properly protect equipment and material from damage, to include the erection of temporary shelters to adequately protect equipment and material stored at the Site. Equipment and/or material which become rusted or damaged shall be replaced or restored by the Contractor to a condition acceptable to the Architect.
- D. The Contractor shall be responsible for the safe storage of his own tools, material and equipment.

1.15 GUARANTEES AND WARRANTIES

- A. Refer to Division 01 and General Conditions for Guarantees and Warranties in addition to requirements specified herein.
- B. Each system and element thereof shall be warranted against defects due to faulty workmanship, design or material for a period of 12 months from date of Substantial Completion, unless specific items are noted to carry a longer warranty in the Construction Documents or manufacturer's standard warranty. The Contractor shall remedy defects occurring within a period of one year from the date of Substantial Completion or as stated in the General Conditions.
- C. The following additional items shall be guaranteed:
 - 1. Piping shall be free from obstructions, holes or breaks of any nature.
 - 2. Insulation shall be effective.
 - 3. Proper circulation of fluid in each piping system.
- D. The above guarantees shall include both labor and material; and repairs or replacements shall be made without additional cost to the Owner.
- E. The remedial work shall be performed promptly, upon written notice from the Architect or Owner.
- F. At the time of Substantial Completion, deliver to the Owner warranties with terms extending beyond the one year guarantee period, each warranty instrument being addressed to the Owner and stating the commencement date and term. Refer to Table 3 at the end of this section for a list of specification sections in Division 22 that contain special warranties.

1.16 PROJECT CONDITIONS

- A. Conditions Affecting Work In Existing Buildings:
 - 1. The Drawings describe the general nature of remodeling to the existing building. However, the Contractor shall visit the Site prior to submitting His bid to determine the nature and extent of work involved.
 - 2. Work in the existing building shall be scheduled with the Owner.
 - 3. Certain demolition work must be performed prior to the remodeling. The Plumbing Contractor shall perform the demolition which involves Plumbing and Plumbing systems, fixtures, equipment, piping, equipment supports or foundations and materials.
 - 4. Plumbing Contractor shall remove articles which are not required for the new Work. Unless otherwise indicated, each item removed by the Plumbing Contractor during this demolition shall become his property and shall be removed by the Plumbing Contractor from the premises and dispose of them in accordance with applicable federal, state and local regulations.
 - 5. Plumbing Contractor shall relocate and reconnect Plumbing facilities that must be relocated in order to accomplish the remodeling shown in the Drawings or indicated in the Specifications. Where Plumbing equipment or materials are removed, the Plumbing Contractor shall cap unused piping beyond the floor line or wall line to facilitate restoration of finish.
 - 6. General Contractor shall install finish material.
 - 7. Protect adjacent materials indicated to remain. Install and maintain dust and noise barriers to keep dirt, dust, and noise from being transmitted to adjacent areas. Remove protection and barriers after demolition operations are complete.
 - 8. Locate, identify, and protect Plumbing services passing through demolition area and serving other areas outside the demolition limits. Maintain services to areas outside demolition limits. When services must be interrupted, install temporary services for affected areas.
- B. Conditions Affecting Excavations: The following project conditions apply:
 - 1. Maintain and protect existing building services which transit the area affected by selective demolition.
 - 2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by excavation operations.

- C. Site Information: Subsurface conditions were investigated during the design of the Project. Reports of these investigations are available for information only; data in the reports are not intended as representations or warranties of accuracy or continuity of conditions. The Owner will not be responsible for interpretations or conclusions drawn from this information.
- D. Environmental Conditions: Apply joint sealers under temperature and humidity conditions within the limits permitted by the joint sealer manufacturer. Do not apply joint sealers to wet substrates.

PART 2 - PRODUCTS AND MATERIALS

2.1 NOT USED

PART 3 - EXECUTION

- 3.1 PERMITS
 - A. Secure and pay for permits required in connection with the installation of the Plumbing Work. Arrange with the various utility companies for the installation and connection of required utilities for this facility and pay charges associated therewith including connection charges and inspection fees, except where these services or fees are designated to be provided by others.
- 3.2 EXISTING UTILITIES
 - A. Schedule and coordinate with the Utility Company, Owner and with the Engineer connection to, or relocation of, or discontinuation of normal utility services from existing utility lines. Premium time required for any such work shall be included in the bid.
 - B. Existing utilities damaged due to the operations of utility work for this project shall be repaired to the satisfaction of the Owner or Utility Company without additional cost.
 - C. Utilities shall not be left disconnected at the end of a work day or over a weekend unless authorized by representatives of the Owner or Engineer.
 - D. Repairs and restoration of utilities shall be made before workmen leave the project at the end of the workday in which the interruption takes place.
 - E. Contractor shall include in his bid the cost of furnishing temporary facilities to provide services during interruption of normal utility service.

3.3 SELECTIVE DEMOLITION

- A. Refer to Division 01, Division 02 and General Conditions for Selective Demolition requirements in addition to the requirements specified herein.
- B. General: Demolish, remove, demount, and disconnect abandoned Plumbing materials and equipment indicated to be removed and not indicated to be salvaged or saved.
- C. Materials and Equipment To Be Salvaged: Remove, demount, and disconnect existing Plumbing materials and equipment indicated to be removed and salvaged, and deliver materials and equipment to the location designated for storage.
- D. Disposal and Cleanup: Remove from the site and legally dispose of demolished materials and equipment not indicated to be salvaged.
- E. Plumbing Materials and Equipment: Demolish, remove, demount, and disconnect the following items:
 - 1. Inactive and obsolete piping, fittings and specialties, equipment, controls, fixtures and insulation.
 - a. Perform cutting and patching required for demolition in accordance with Division 01, General Conditions and "Cutting and Patching" portion of this Section in Division 22.
- F. Provide schedules indicating proposed methods and sequence of operations for selective demolition prior to commencement of Work. Include coordination for shut-off of utility services and details for dust and noise control.
 - 1. Coordinate sequencing with construction phasing and Owner occupancy specified in Division 01 Section "Summary of Work."

3.4 CUTTING AND PATCHING

- A. Cut portions of the facility as required to install work under this Division.
- B. Do not cut or disturb structural members without prior approval from the Architect and Structural Engineer.
- C. Patch around openings to match adjacent construction, including fire ratings, if applicable.
- D. Repair and refinish areas disturbed by work to the condition of adjoining surfaces in a manner satisfactory to the Architect.

3.5 CLEANING

- A. Dirt and refuse resulting from the performance of the work shall be removed from the premises as required to prevent accumulation. The Plumbing Contractor shall cooperate in maintaining reasonably clean premises at all times.
- B. Immediately prior to the final inspection, the Plumbing Contractor shall clean material and equipment installed under the Plumbing Contract. Dirt, dust, plaster, stains, and foreign matter shall be removed from surfaces including components internal to equipment. Damaged finishes shall be touched-up and restored to their original condition.

3.6 SUBSTANTIAL COMPLETION REVIEW

- A. Prior to requesting inspection for "CERTIFICATE OF SUBSTANTIAL COMPLETION", the Contractor shall complete the following items:
 - 1. Submit complete Operation and Maintenance Manuals.
 - 2. Submit complete Record Drawings.
 - 3. Start-up testing of systems.
 - 4. Comply with requirements for Substantial Completion in the "General Conditions".
- B. The Contractor shall request in writing a review for Substantial Completion. The Contractor shall give the Architect/Engineer at least seven (7) days notice prior to the review.
- C. The Contractor's written request shall state that the Contractor has complied with the requirements for Substantial Completion.
- D. Upon receipt of a request for review, the Architect/Engineer will either proceed with the review or advise the Contractor of unfulfilled requirements.
- E. If the Contractor requests a site visit for Substantial Completion review prior to completing the above mentioned items, He shall reimburse the Architect/Engineer for time and expenses incurred for the visit.
- F. Upon completion of the review, the Architect/Engineer will prepare a "final list" of outstanding items to be completed or corrected for final acceptance.
- G. Omissions on the "final list" shall not relieve the Contractor from the requirements of the Contract Documents.
- H. Prior to requesting a final review, the Contractor shall submit a copy of the final list of items to be completed or corrected. He shall state in writing that each item has been completed, resolved for acceptance or the reason it has not been completed.

END OF SECTION 220010

SPECIFICATIO	N NUMBER/TITLE	CODE DESIGNATION
000040		NONE
220010	General Plumbing Requirements	NONE
220015	Coordination	NONE
220500	Common Work Results For Plumbing	A, B, G, M
220513	Common Motor Requirements For Plumbing Equipment	В
220515	Basic Piping Materials And Methods	B, G
220523	General-Duty Valves For Plumbing Piping	В
220529	Hangers And Supports For Plumbing Piping	B, F, G, H
221300	Sanitary Drainage & Vent Piping & Specialties	В
221329	Sanitary Sewerage Pumps	A, B, C, E
CODED LEGE	ND	

A 5	Shop Drawings
-----	---------------

- В
- Product Data and equipment weights Performance Data, Curves, Certificates and Test Data С
- D
- Coordination Drawings Wiring Diagrams and short circuit current ratings Е
- F Installation Instructions
- Welder's Certificates G
- Н Certificates
- L Calculations
- Special Inspections Special Warranties J
- Κ
- Material Samples L
- Schedules Μ
- Ν **Recommended Spare Parts List**

TABLE 2: PLUMBING SPECIFICATION OPERATION AND MAINTENANCE SUBMITTAL REQUIREMENTS

SPECIFICATION NUMBER/TITLE		CODE DESIGNATION
		_
220500	Common Work Results For Plumbing	В
220513	Common Motor Requirements For Plumbing Equipment	В
220515	Basic Piping Materials And Methods	В
220519	Meters And Gauges For Plumbing Piping	B, G, I
220523	General-Duty Valves For Plumbing Piping	B, H, I
220529	Hangers And Supports For Plumbing Piping	В
221300	Sanitary Drainage & Vent Piping & Specialties	A, B, F
221329	Sanitary Sewerage Pumps	B, C, D, E, G, H, I

CODED LEGEND

- А As-Built Drawings
- В Product Data
- С Performance Data, Capacities, Curves and Certificates
- D Wiring Diagrams
- Е Operating Instructions
- F Test Reports
- G Warranties
- Н
- Recommended Spare Parts List Service and Maintenance Instructions L
SUBSTITUTION REQUEST FORM

o Project Engineer: Request # (GC Determined):	
Project Name:	
Project No/Phase:	Date:
Specification Title:	
Section Number:	_ Page: Article/Paragraph:
Proposed Substitution:	
Manufacturer:	Model No.:
Address:	Phone:
History: 🗌 New product 🛛 1-4 years old	☐ 5-10 years old ☐ More than 10 years old
Differences between proposed substitution and	d specified Work:
Point-by-point comparative data attached – Comparative data may include but not be limite visual effect, sustainable design characteristics Include all information necessary for an evaluat	REQUIRED BY ENGINEER ed to performance, certifications, weight, size, durability, s, warranties, and specific features and requirements. tion.
Supporting Data Attached: Drawings Tests	Product Data Samples Reports Other:
Reason for not providing specified item:	
Similar Installation: Project:	Architect:
Address:	Owner:
	Date Installed:
Proposed substitution affects other parts of Wo	ork: 🗌 No 🗋 Yes; explain:

Substitution Certification Statement:

Unless stated otherwise in writing to the Engineer by the Contractor, Contractor warrants to the Engineer, Architect, and Owner that the:

- A. Proposed substitution has been fully investigated and determined to meet or exceed the specified Work in all respects.
 - B. Proposed substitution is consistent with the Contract Documents and will produce indicated results.
 - C. Proposed substitution does not affect dimensions and functional clearances.
 - D. Proposed substitution has received necessary approvals of authorities having jurisdiction.
 - E. Same warranty will be furnished for proposed substitution as for specified Work.
 - F. Same maintenance service and source of replacement parts, as applicable, is available.
 - G. Proposed substitution will not adversely affect other trades or delay construction schedule.
 - H. Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitting Contractor

Date

Company

Manufacturer's Certification of Equal Quality:

I ______ represent the manufacturer of the Proposed Substitution item and hereby certify and warrant to Architect, Engineer, and Owner that the function and quality of the Proposed Substitution meets or exceeds the Specified Item.

	Manufacturer's Representative		Date	Company
Engine	er Review and Recommendati	on Section		
	Recommend Acceptance	🗌 Yes	🗌 No	
	Additional Comments:	Attached	🗌 None	
Accept	ance Section: Contractor Acceptance Sig	gnature	Date	Company
	Owner Acceptance Sigr	nature	Date	Company
	Architect Acceptance Sig	Inature	Date	Company
	Engineer Acceptance Sig	nature	Date	Company

COORDINATION

PART 1 - GENERAL REQUIREMENTS

1.1 SUMMARY

- A. This Section specifies the basic requirements for electrical components which are an integral part of packaged plumbing equipment. These components include, but are not limited to factory furnished motors, starters, and disconnect switches furnished as an integral part of packaged plumbing equipment.
- B. Specific electrical requirements (i.e. horsepower and electrical characteristics) for plumbing equipment are scheduled on the Drawings.
- C. System shall be complete and operational with power and control wiring provided to meet the design intent shown on the drawings and specified within the specification sections.
- 1.2 SUBMITTALS
 - A. No separate submittal is required. Submit product data for motors, starters, and other electrical components with submittal data required for the equipment for which it serves, as required by the individual equipment specification Sections.
- 1.3 QUALITY ASSURANCE
 - A. Electrical components and materials shall be UL labeled.
 - B. All electrical equipment provided and the wiring and installation of electrical equipment shall be in accordance with the requirements of this Section and Division 26.

PART 2 - PRODUCTS AND MATERIALS

- 2.1 GENERAL
 - A. The Contractors shall provide all motors, starters, disconnects, wire, conduit, etc. as specified in the Construction Documents. If, however, the Plumbing Contractor furnishes a piece of equipment requiring a different motor, starter, disconnect, wire size, etc. than what is shown and/or intended on the Construction Documents, the Plumbing Contractor shall coordinate the requirements with any other Contractor and shall be responsible for any additional cost incurred by any other Contractor that is associated with installing the different equipment and related accessories for proper working condition.
 - B. Refer to Division 26, "Common Work Results for Electrical" for specification of motor connections
 - C. Refer to Division 26, "Enclosed Switches and Circuit Breakers" for specification of disconnect switches.

PART 3 - EXECUTION

- 3.1 CONTRACTOR COORDINATION
 - A. Unless otherwise indicated, all motors, equipment, controls, etc. shall be furnished, set in place and wired in accordance with Table 1. Any items not listed but shown on the drawings shall be considered part of the Contract Documents and brought to the attention of the Architect.
 - B. The General Contractor is the central authority governing the total responsibility of all trade contractors. Therefore, deviations and clarifications of this schedule are permitted provided the General Contractor assumes responsibility to coordinate the trade contractors different than as indicated herein. If deviations or clarifications to this schedule are implemented, submit a record copy to the Engineer.

TABLE 1: ELECTRICAL REQUIREMENTS FOR PLUMBING EQUIPMENT

ITEM	FURN BY	SET BY	POWER WIRING	CONTROL WIRING
Equipment motors	DIV 22	DIV 22	DIV 26	
Factory furnished motor starters, contactors and disconnects	DIV 22	DIV 26	DIV 26	DIV 23
Loose motor starters, disconnect switches, thermal overloads and heater	DIV 26 s.	DIV 26	DIV 26	DIV 23
Factory assembled control panels Control relays and transformers	DIV 22 DIV 22	DIV 26 DIV 22	DIV 26 DIV 26	DIV 23 DIV 23

DIV 22 = Plumbing Contractor DIV 26 = Electrical Contractor

DIV 23 = Building Automation System Contractor, refer to Division 23 Section "Direct-Digital Control for HVAC".

END OF SECTION 220015

COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL REQUIREMENTS

1.1 SUMMARY

- A. This Section includes limited scope general construction materials and methods for application with Plumbing installations as follows:
 - 1. Plumbing equipment nameplate data.
 - 2. Non-shrink grout for equipment installations.
 - 3. Miscellaneous metals for support of Plumbing materials and equipment.
 - 4. Anchorage for support of Plumbing materials and equipment.
 - 5. Joint sealers for sealing around Plumbing materials and equipment.
- B. Related Sections: The following sections contain requirements that relate to this Section:
 - 1. Division 22 Section "Basic Piping Materials and Methods" for materials and methods for mechanical sleeve seals.
 - 2. Division 22 Section "Sanitary Drainage and Vent Piping and Specialties" for indirect drain piping and installation requirements.
 - 3. Division 26 Section "Common Work Results for Electrical" required electrical devices.
 - 4. Division 26 Sections "Enclosed Switches and Circuit Breakers" for field-installed disconnects.
- 1.2 SUBMITTALS
 - A. General: Submit the following in accordance with Division 1 and Division 22 Section "General Plumbing Requirements".
 - 1. Product data for the following products:
 - a. Joint sealers.
 - 2. Shop drawings detailing fabrication and installation for metal fabrications, and anchorage for Plumbing materials and equipment.
 - 3. Welder certificates, signed by Contractor, certifying that welders comply with requirements specified under "Quality Assurance" article of this Section.
 - 4. Schedules indicating proposed methods and sequence of operations for selective demolition prior to commencement of Work. Include coordination for shut-off of utility services and details for dust and noise control.
 - a. Coordinate sequencing with construction phasing and Owner occupancy specified in Division 1 Section "Summary of Work."

1.3 QUALITY ASSURANCE

- A. Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code Steel."
 - 1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

PART 2 - PRODUCTS AND MATERIALS

2.1 PLUMBING EQUIPMENT NAMEPLATE DATA

A. For each piece of power operated Plumbing equipment, provide a permanent operational data nameplate indicating manufacturer, product name, model number, serial number, capacity,

operating and power characteristics, labels of tested compliance's, and similar essential data. Locate nameplates in an accessible location.

- 2.2 MISCELLANEOUS METALS
 - A. Steel plates, shapes, bars, and bar grating: ASTM A 36.
 - B. Cold-Formed Steel Tubing: ASTM A 500.
 - C. Hot-Rolled Steel Tubing: ASTM A 501.
 - D. Steel Pipe: ASTM A 53, Schedule 40, welded.
 - E. Fasteners: Zinc-coated, type, grade, and class as required.

PART 3 - EXECUTION

- 3.1 ERECTION OF METAL SUPPORTS AND ANCHORAGE
 - A. Cut, fit, and place miscellaneous metal fabrications accurately in location, alignment, and elevation to support and anchor Plumbing materials and equipment.
 - B. Field Welding: Comply with AWS "Structural Welding Code."
- 3.2 ERECTION OF ANCHORAGE
 - A. Cut, fit, and place anchorage accurately in location, alignment, and elevation to support and anchor Plumbing materials and equipment.
 - B. Select fastener sizes that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood members.
 - C. Attach to substrates as required to support applied loads.
- 3.3 PREPARATION FOR JOINT SEALERS
 - A. Surface Cleaning for Joint Sealers: Clean surfaces of joints immediately before applying joint sealers to comply with recommendations of joint sealer manufacturer.
 - B. Apply joint sealer primer to substrates as recommended by joint sealer manufacturer. Protect adjacent areas from spillage and migration of primers, using masking tape. Remove tape immediately after tooling without disturbing joint seal.

END OF SECTION 220500

COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT

PART 1 - GENERAL REQUIREMENTS

- 1.1 SUMMARY
 - A. This Section includes the following:
 - 1. Three phase electric motors.
- 1.2 SUBMITTALS
 - A. General: Submit the following in accordance with conditions of contract and Division 1 specification Sections.
 - 1. Product Data: Show nameplate data and ratings; characteristics; mounting arrangements; size and location of winding termination lugs, conduit entry, and grounding lug; and coatings.

1.3 QUALITY ASSURANCE

A. All motors shall be UL listed.

PART 2 - PRODUCTS AND MATERIALS

2.1 MANUFACTURERS

- A. Century
- B. General Electric
- C. Westinghouse
- D. Baldor
- E. Gould
- 2.2 GENERAL CONSTRUCTION AND REQUIREMENTS
 - A. Motors Less Than 250 Watts, for Intermittent Service: Provide equipment manufacturer's standard. Motor's need not conform to these specifications.
 - B. Electrical Service: All motors shall be supplied in accordance with the following voltage and phase unless noted otherwise on the Drawings.
 - 1. Motors 3/4 HP and Larger: 480 volts, three phase, 60 Hz.
 - C. Type:
 - 1. Open drip-proof except where noted otherwise.
 - 2. Motors: Design for continuous operation in 40 degrees C environment.
 - 3. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
 - 4. Motors with frame sizes 254T and larger: Energy Efficient Type.
 - D. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.
 - E. Wiring Terminations:
 - 1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
 - 2. For fractional horsepower motors, provide flexible conduit connection in end frame. Maximum length of flexible conduit shall be five feet.
- 2.3 THREE PHASE POWER SQUIRREL CAGE MOTORS
 - A. Starting Torque: Between 1 and 1-1/2 times full load torque.

- B. Starting Current: Six times full load current.
- C. Power Output, Locked Rotor Torque, Breakdown or Pull Out Torque: NEMA Design B characteristics.
- D. Design, Construction, Testing, and Performance: Conform to NEMA MG 1 for Design B motors.
- E. Insulation System: NEMA Class B or better.
- F. Drip-proof Enclosure: NEMA Service Factor.
- G. All motors controlled by variable frequency controllers shall have a 1.15 Service Factor.
- H. Testing Procedure: In accordance with IEEE 112. Load test motors to determine free from electrical or mechanical defects in compliance with performance data.
- I. Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.
- J. Thermistor System (Motor Frame Sizes 254T and Larger): Three PTC thermistors imbedded in motor windings and epoxy encapsulated solid state control relay for wiring into motor starter; refer to Division 16 Motor Controlling Equipment.
- K. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum AFBMA 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
- L. Sound Power Levels: To NEMA MG 1.
- M. Nominal Efficiency: Motors shall have minimum efficiency meeting the requirements of the Energy Policy Act of 1992 and as scheduled at full load and rated voltage when tested in accordance with IEEE 112.
- N. Nominal Power Factor: As scheduled at full load and rated voltage when tested in accordance with IEEE 112.

2.4 CAPACITORS

- A. Furnish capacitors for power factor correction as specified herein on motors furnished under Division 22 that are not connected to variable frequency drives. KVAR size shall be as required to correct motor power factor to 90 percent or better and shall be installed on all motors 1 horsepower and larger, that have an uncorrected power factor of less than 85 percent at rated load.
- B. Features:
 - 1. Individual unit cells.
 - 2. All welded steel housing.
 - 3. Each capacitor internally fused.
 - 4. Non-flammable synthetic liquid impregnated.
 - 5. Craft tissue insulation.
 - 6. Aluminum foil electrodes.

PART 3 - EXECUTION

- 3.1 INSTALLATION
 - A. Install in accordance with manufacturer's instructions.
 - B. Install securely on firm foundation.
 - C. Check line voltage and phase and ensure agreement with nameplate.

3.2 NEMA OPEN MOTOR SERVICE FACTOR SCHEDULE

HP	3600 RPM	1800 RPM	1200 RPM	900 RPM
1/6-1/3	1.35	1.35	1.35	1.35
1/2	1.25	1.25	1.25	1.15
3/4	1.25	1.25	1.15	1.15
1	1.25	1.15	1.15	1.15
1.5-150	1.15	1.15	1.15	1.15

3.3 PERFORMANCE SCHEDULE: THREE PHASE - OPEN DRIP-PROOF

HP	RPM(Sync)	NEMA Frame	Minimum Percent Efficiency	Minimum Power Factor
3	1800	182T	86.5	86
5	1800	184T	87.5	87
7-1/2	1800	213T	88.5	86
5	3600	182T	85.5	86
7-1/2	3600	184T	87.5	88
10	3600	213T	88.5	86

3.4 PERFORMANCE SCHEDULE: THREE PHASE-ENERGY EFFICIENT, TOTALLY ENCLOSED, FAN COOLED

HP	RPM(Sync)	NEMA Frame	Minimum Percent Efficiency	Minimum Power Factor
3	1800	182T	87.5	83
5	1800	184T	87.5	83
7-1/2	1800	213T	89.5	85
5	3600	184T	87.5	88
7-1/2	3600	213T	88.5	86
10	3600	215T	89.5	86

END OF SECTION 220513

BASIC PIPING MATERIALS AND METHODS

PART 1 - GENERAL REQUIREMENTS

- 1.1 SUMMARY
 - A. This Section specifies piping materials and installation methods common to more than one Section of Division 22 and includes joining materials, piping specialties and basic piping installation instructions.
 - B. Related Sections: The following sections contain requirements that relate to this Section:
 - 1. Division 22 Section "Common Work Results for Plumbing," for materials and methods for sleeve materials.
- 1.2 DEFINITIONS
 - A. Lead Free: Refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content ≤0.25% per Safe Drinking Water Act as amended January 4th 2011 Section 1417.
- 1.3 SUBMITTALS
 - A. Refer to Division 1 and Division 22 Section "General Plumbing Requirements" for administrative and procedural requirements for submittals.
 - B. Product Data: Submit product data on the following items:
 - 1. Dielectric Unions
 - 2. Dielectric Flanges and Flange Kits
 - C. Quality Control Submittals:
 - 1. Submit welders' certificates specified in Quality Assurance below.
 - D. Submit certification that specialties and fittings for domestic water distribution comply with NSF 61 Annex G and / or NSF 372.
 - E. Submit a schedule of dissimilar metal joints and dielectric waterway fittings, unions, flanges or flange kits. Include joint type materials, connection method and proposed dielectric waterway fittings, unions and flanges to isolate dissimilar metals. Include minimum and maximum torque requirements for flange connections to valves. Refer to the individual piping system specification sections in Division 22 for specifications for piping materials and fittings relative to that particular system and additional requirements.
 - F. Submit certification that fittings and specialties are manufactured in plants located in the United States or certified that they comply with applicable ANSI and ASTM standards.
- 1.4 QUALITY ASSURANCE
 - A. Welder's Qualifications: All welders shall be qualified in accordance with ASME Boiler and Pressure Vessel Code, Section IX, Welding and Brazing Qualifications.
 - B. Welding procedures and testing shall comply with ANSI Standard B31.9 Standard Code for Building Services Piping and The American Welding Society, Welding Handbook.
 - C. Pipe specialties and fittings shall be manufactured in plants located in the United States or certified to meet the specified ASTM and ANSI standards.
 - D. Comply with NSF 61 Annex G and / or NSF 372 for wetted surfaces of specialties and fittings containing no more than 0.25% lead by weight for domestic water distribution.

PART 2 - PRODUCTS AND MATERIALS

2.1 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide piping materials and specialties from one of the following:

- 1. Dielectric Unions:
 - a. JOMAR International
 - b. Smith Cooper International
 - c. Watts Regulator Co.
 - d. Zurn Industries
- 2. Dielectric Flanges and Flange Kits:
 - a. Advance Products & Systems
 - b. Calpico, Inc.
 - c. FMC Technologies
 - d. Pipeline Seal & Insulator, Inc.
 - e. Tampa Rubber and Gasket Co., inc.
 - f. Watts Industries Inc.; Water Products Div.
 - g. Zurn Industries, Inc.; Wilkins Div.
- 2.2 PIPE AND FITTINGS
 - A. Refer to the individual piping system specification sections in Division 22 for specifications on piping and fittings relative to that particular system.
 - B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.
- 2.3 JOINING MATERIALS
 - A. Refer to individual Division 22 Piping Sections for special joining materials not listed below.
 - B. Welding Materials: AWS D10.12; Comply with Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials appropriate for the wall thickness and chemical analysis of the pipe being welded.
 - C. Gaskets for Flanged Joints: ASME B16.21; Gasket material shall be full-faced for cast-iron flanges and raised-face for steel flanges. Select materials to suit the service of the piping system in which installed and which conform to their respective ANSI Standard (A21.11, B16.20, or B16.21). Provide materials that will not be detrimentally affected by the chemical and thermal conditions of the fluid being carried.
- 2.4 PIPING SPECIALTIES
 - A. Unions:
 - 1. Malleable-iron, Class 150 for low pressure service and class 300 for high pressure service; hexagonal stock, with ball-and-socket joints, metal-to-metal bronze seating surfaces; female threaded ends.
 - B. Dielectric Unions: Factory-fabricated with lead free cast bronze body meeting ASTM B584 and galvanized steel body with plastic dielectric gasket, class 125 for low pressure service and class 250 for high pressure service, and appropriate end connections for the pipe materials in which installed (screwed or soldered) to effectively isolate dissimilar metals, prevent galvanic action, and stop corrosion.
 - C. Dielectric Flanges and Flange Kits:
 - 1. Full faced gasket with same outside diameter and bolt hole arrangement as the flange. Pressure rating of 200psi for low pressure service and 400 psi for high pressure service at a continuous operating temperature of 180F.
 - 2. Steel washers, thermoplastic washers and bolt isolation sleeves or thermoplastic combination washers and bolt sleeves.
 - 3. Lead free cast bronze meeting ASTM B584, class 125 solder type or cast iron class 125 threaded type for low pressure service and bronze class 250 solder type or cast iron class 250 threaded type for high pressure service.

PART 3 - EXECUTION

- 3.1 INSTALLATION, GENERAL
 - A. Install in accordance with manufacturer's installation instructions.
- 3.2 PREPARATION
 - A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 - B. Remove scale, slag, dirt, and debris for both inside and outside of piping and fittings before assembly.
- 3.3 INSTALLATIONS
 - A. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of the piping systems. Location and arrangement of piping layout take into consideration pipe sizing and friction loss, expansion, pump sizing, and other design considerations. So far as practical, install piping as indicated. Refer to individual system specifications for requirements for coordination drawing submittals.
 - B. Support piping from structure.
 - C. Verify final equipment locations for roughing in.
- 3.4 PIPING PROTECTION
 - A. Protect piping during construction period, to avoid clogging with dirt and debris, and to prevent damage from traffic and construction work.
 - B. Place plugs in ends of uncompleted piping at end of day or whenever work stops.
- 3.5 FITTINGS AND SPECIALTIES
 - A. Use fittings for all changes in direction and all branch connections.
 - B. Remake leaking joints using new materials.
 - C. Install components with pressure rating equal to or greater than system operating pressure.
 - D. Install flanges at the final connection to each piece of equipment, adjacent to each isolation valve or valve assembly in piping 2-1/2" and larger. Install flanges at each valve 2-1/2" and larger.
 - E. Install dielectric flanges for piping 2-1/2" and larger to connect piping materials of dissimilar metals in wet piping systems (water) for copper or brass connected to carbon steel, cast or ductile iron.
 - F. Dielectric Flange Installation:
 - 1. Provide brass nipples between the equipment connection and dielectric flange for screwed connections. Provide an iron flange for the equipment side and a bronze flange for the copper or brass piping side of the joint.
 - 2. Provide a bronze flange for the copper or brass piping connection to a cast iron, ductile iron or steel flange.
 - 3. Provide full face gasket with pressure rating equal to system served.
 - 4. At each bolt provide, steel washers, thermoplastic washers and bolt isolation sleeves or thermoplastic combination washers and bolt sleeves.

3.6 JOINTS

- A. Steel Pipe Joints:
 - 1. Pipe 2" and Smaller: Thread pipe with tapered pipe threads in accordance with ANSI B2.1. Cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint lubricant or sealant suitable for the service for which the pipe is intended on the male threads at each joint and tighten joint to leave not more than 3 threads exposed.
 - 2. Pipe Larger Than 2":
 - a. Weld pipe joints (except for exterior water service pipe) in accordance with ASME Code for Pressure Piping, B31.
 - b. Weld pipe joints of exterior water service pipe in accordance with AWWA C206.

- c. Install flanges on all valves, apparatus, and equipment. Weld pipe flanges to pipe ends in accordance with ASME B31.9 Code for Building Services Piping. Clean flange faces and install gaskets. Tighten bolts to torque specified by manufacturer of flange and flange bolts, to provide uniform compression of gaskets.
- B. Joints for other piping materials are specified within the respective piping system Sections.
- 3.7 PIPE FIELD QUALITY CONTROL
 - A. Testing: Refer to individual piping system specification sections.
 - B. Inspection Report Form: Refer to the inspection report form at the end of this section for inspection data to be completed for each piping system. Submit completed forms to the Owner and Engineer.

END OF SECTION 220515

PLUMBING & PLUMBING PIPING SYSTEMS INSPECTION REPORT FORM

Project Name: Project No:			Contractor Project No	
General Contractor:				
Inspection Date:			Temperature:	
System Inspected				
Building:				
Location/Description:				
Service:				
Inspection Results				
Time of Inspection:				
Approval to Insulate:	Y	Ν	Approval to Cover in Wall:	Y N
Approval to backfill	Y	Ν		
Signatures				
Witness:			Representing:	
Witness:			Representing:	
Witness:			Representing:	
Remarks				
Contractor Supervisor's	signat	ure:		·

SANITARY DRAINAGE AND VENT PIPING AND SPECIALTIES

PART 1 - GENERAL REQUIREMENTS

- 1.1 SUMMARY
 - A. This Section includes building sanitary drainage and vent piping systems, including drains and drainage specialties.
 - B. Related Sections: The following sections contain requirements that relate to this Section:
 - 1. Division 22 Section "General Plumbing Requirements," for trenching and backfilling materials and methods for underground piping installations.
 - 2. Division 22 Section "Common Work Results for Plumbing," for materials and methods for fire barrier penetrations, wall and floor penetrations and equipment pads
 - 3. Division 22 Section "Basic Piping Material and Methods," for materials and methods for mechanical sleeve seals.
 - 4. Division 22 Section "Hangers and Supports for Plumbing Piping," for materials and methods for hanging and supporting drainage and vent piping.

1.2 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specifications Sections.
- B. Product data for the following products:
 - 1. Drainage piping
 - 2. Drainage piping specialties
- C. Test reports specified in Part 3 of this Section.

PART 2 - PRODUCTS AND MATERIALS

- 2.1 UNDERGROUND BUILDING DRAIN AND VENT PIPE AND FITTINGS
 - A. Refer to Part 3, Article "Pipe Applications Below Ground, Within Building" for identification of systems where the materials listed below are used.
 - B. Steel Pipe: ASTM A53, Type E or S, schedule 40, Grade B, galvanized, threaded ends.
 - 1. Galvanized Malleable Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern, for threaded joints. Threads shall conform to ASME B1.20.1.

PART 3 - EXECUTION

- 3.1 INSTALLATION, GENERAL
 - A. Install pipe and specialties in accordance with manufacturer's installation instructions.
- 3.2 PIPE APPLICATIONS BELOW GROUND INSIDE PIT
 - A. Install galvanized schedule 40 steel pipe and malleable iron fittings for sump pump discharge pipe.
- 3.3 INSTALLATION
 - A. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of the piping systems. Location and arrangement of piping layout take into consideration pipe sizing, slope, expansion, and other design considerations. So far as practical, install piping as indicated.
 - B. Use fittings for all changes in direction and all branch connections.

- C. Install piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated.
- D. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.
- 3.4 HANGERS AND SUPPORTS
 - A. General: Hanger, support, insulation protection shields, and anchor components and installation procedures conforming to MSS SP-58 and SP-69 are specified in Division 22 Section "Hangers and Supports for Plumbing Piping". Conform to the table below for maximum spacing of supports.
 - B. Install the following pipe attachments:
 - 1. Adjustable clevis hangers, MSS SP-69 Type 1, for individual horizontal runs.
 - 2. Riser clamps, MSS SP-69 Type 8, for individual vertical runs.
 - C. Install hangers with maximum horizontal spacing and minimum rod diameters, to comply with MSS-58, locally enforced codes, this specification, and authorities having jurisdiction requirements, whichever are most stringent. Install hangers for horizontal piping with the following maximum spacing and minimum rod diameters:

Nom. Pipe	Steel Pipe	Min. Rod
<u>Size – In.</u>	<u>Max. Span – Ft.</u>	<u>Dia In.</u>
2	10	3/8
2-1/2 to 4	10	3/8

- 1. Support all sizes of vertical steel piping every ten feet.
- 2. Support piping within 12" of each elbow or tee.
- 3. Support each P-trap.
- 3.5 FIELD QUALITY CONTROL
 - A. Inspections
 - 1. Do not enclose, cover, or put into operation drainage and vent piping system until it has been inspected and approved by the authority having jurisdiction.
 - 2. During the progress of the installation, notify the plumbing official having jurisdiction, at least 24 hours prior to the time such inspection must be made. Perform tests specified below in the presence of the plumbing official.
 - a. Rough-in Inspection: Arrange for inspection of the piping system before concealed or closed-in after system is roughed-in, and prior to setting fixtures.
 - b. Final Inspection: Arrange for a final inspection by the plumbing official to observe the tests specified below and to insure compliance with the requirements of the plumbing code.
 - c. Reinspections: Whenever the piping system fails to pass the test or inspection, make the required corrections, and arrange for reinspected by the plumbing official.
 - d. Reports: Prepare inspection reports, signed by the plumbing official.
 - B. Piping System Test: Test drainage and vent system in accordance with the procedures of the authority having jurisdiction, or in the absence of a published procedure, as follows:
 - 1. Test for leaks and defects all new drainage and vent piping systems and parts of existing systems, which have been altered, extended or repaired. If testing is performed in segments, submit a separate report for each test, complete with a diagram of the portion of the system tested.
 - 2. Leave uncovered and unconcealed all new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose all such work for testing, that has been covered or concealed before it has been tested and approved.
 - 3. Rough Plumbing Test Procedure: Except for outside leaders and perforated or open jointed drain tile, test the piping of plumbing drainage and venting systems upon completion of the rough piping installation. Tightly close all openings in the piping system, and fill with water

to the point of overflow, but not less than 10 feet head of water. Water level shall not drop during the period from 15 minutes before the inspection starts, through completion of the inspection. Inspect all joints for leaks.

- 4. Final Plumbing Test Procedure: After the plumbing fixtures have been set and their traps filled with water, their connections shall be tested and proved gas and water-tight. Tightly close all openings, initially except vents thru the roof, in the system and fill the system with smoke from one or more smoke machines designed for smoke testing of plumbing systems. When smoke appears at a vent thru the roof, seal the vent thru roof with a test plug. Pressurize the system with 1" water column of smoke for 15 minutes. Use a "U" tube or manometer inserted in the trap of a water closet to measure this pressure. Visually verify all joints for leaks.
- 5. Repair all leaks and defects using new materials and retest system or portion thereof until satisfactory results are obtained.
- 6. Reports: Prepare inspection reports and required corrective action signed by the plumbing official and turn over to the Architect upon completion of the project.
- 3.6 ADJUSTING AND CLEANING
 - A. Clean interior of piping system. Remove dirt and debris as work progresses.
 - B. Clean drain strainers, domes, and traps. Remove dirt and debris.
- 3.7 PROTECTION
 - A. Place plugs in ends of uncompleted piping at end of day or whenever work stops.

END OF SECTION 221300

SANITARY SEWERAGE PUMPS

PART 1 - GENERAL REQUIREMENTS

1.1 SUMMARY

- A. This Section includes the following types of plumbing pumps:
 - 1. Sewage ejectors
- B. Related Sections: The following sections contain requirements that relate to this Section:
 - 1. Division 3 Section "Concrete Work" for specifications on concrete and reinforcing materials and concrete placing requirements for sump basins and covers.
 - 2. Division 22 Section "Coordination" for basic requirements for electrical components that are an integral part of packaged system components.
 - 3. Division 22 Section "Basic Piping Material and Methods," for materials and methods for mechanical sleeve seals.
 - 4. Division 22 Section "Sanitary Drainage and Vent Piping and Specialties" for sewage ejector discharge pipe material and installation requirements.
 - 5. Division 26 Section "Common Work Results for Electrical" required electrical devices.
 - 6. Division 26 Sections "Enclosed Switches and Circuit Breakers" for field-installed disconnects.

1.2 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
 - 1. Product data including standard performance curves, weights (shipping, installed, and operating), furnished specialties, and accessories, plus installation and start-up instructions.
 - 2. Shop drawings showing layout and connections for plumbing pumps. Include setting drawings with templates, and directions for installation of foundation bolts, anchor bolts, and other anchorages.
 - 3. Wiring diagrams detailing wiring for power, signal, and control systems; differentiating between manufacturer-installed wiring and field-installed wiring.
 - 4. Maintenance data for plumbing pumps, for inclusion in Operating and Maintenance Manuals specified in Division 1 and Division 22 Section "General Plumbing Requirements."
 - 5. Shop drawings showing basins with depth, inlet, outlet and vent locations, pit covers, float switches, non-clog check valves and shutoff valves.

1.3 QUALITY ASSURANCE

- A. Hydraulic Institute Compliance: Design, manufacture, and install plumbing pumps in accordance with "Hydraulic Institute Standards."
- B. National Electrical Code Compliance: Components shall comply with NFPA 70 "National Electrical Code."
- C. UL Compliance: Control panels shall be listed and labeled by UL and comply with Standard 508A "Control Panels".
- D. NEMA Compliance: Electric motors and components shall be listed and labeled NEMA.
- E. SSPMA Compliance: Test and rate sewage pumps in accordance with the Sump and Sewage Pump Manufacturers Association (SSPMA) Standards.
- F. Single-Source Responsibility: Obtain plumbing pumps of the same type from a single manufacturer.
- G. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) Compliance: Comply with the MSS Standard Practices below:
 - 1. MSS SP 72 "Ball Valves with Flanged or Butt Welding Ends"

- 2. MSS SP 110 "Ball Valves, Threaded, Socket Welding, Solder Joint, Grooved and Flared Ends"
- H. Valves shall be manufactured in plants located in the United States or certified that they comply with applicable ANSI, ASTM and MSS standards.
- I. Design Criteria: The Drawings indicate sizes, profiles, connections, and dimensional requirements of plumbing pumps and are based on the specific manufacturer types and models indicated. Pumps having equal performance characteristics by other manufacturers may be considered, provided that deviations in dimensions and profiles do not change the design concept or intended performance as judged by the Architect. The burden of proof for equality of plumbing pumps is on the proposer.
- 1.4 WARRANTY
 - A. Warranty on Pumps: Provide written warranty, signed by manufacturer, agreeing to replace/repair, within warranty period, pumps with inadequate or defective materials and workmanship, including leakage, breakage, improper assembly, or failure to perform as required; provided manufacturer's instructions for handling, installing, protecting, and maintaining units have been adhered to during warranty period. Replacement includes both parts and labor for removal and reinstallation.
 - 1. Warranty Period: One year from date of substantial completion.

PART 2 - PRODUCTS AND MATERIALS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Sewage Pump High Level Alarms:
 - a. Weil Pump Company
 - b. Zoeller Pump Company
 - c. SJE Rhombus
 - 2. Submersible Sewage Ejectors:
 - a. Sulzer
 - b. FLYGT
 - c. Weil Pump Company
 - 3. Full Port Bronze Ball Valves 2" and smaller:

MANUFACTURER	THREADED ENDS	SOLDER ENDS
Apollo Hammond	77C-100 8301A	77C-200 8311A
Milwaukee	BA-400	BA-450
Nibco	T-585-70	S-585-70

- 4. Non-Clog "Flapper Type" Check Valves:
 - a. Liberty Pumps "Series CVXXXC"
 - b. Little Giant Pump Company "Series CV-SE"
 - c. Zoeller Pump Company "Series 30"
- 5. Cast Iron "Sinking Ball Type" Non-Clog Check Valves 2" and smaller:
 - a. Flomatic"208".
 - b. FLYGT "2002"
 - c. GW Industries, Inc. "240T"
- 6. Basin Covers:
 - a. Bilco
 - b. U.S.F. Fabrication
- 7. Control Panels

- a. Cougar Sales
- b. Sulzer
- c. FLYGT
- d. Weil Pump Company
- 2.2 PUMPS, GENERAL
 - A. Pumps: factory assembled and factory tested.
 - B. Preparation for shipping: After assembly and testing, clean flanges and exposed machined metal surfaces and treat with an anticorrosion compound. Protect flanges, pipe openings, and nozzles with wooden flange covers or with screwed-in plugs.
 - C. Motors: Conform to NEMA standards; single, multiple, or variable speed with type of enclosure and electrical characteristics as indicated; have built-in thermal-overload protection and grease-lubricated ball bearings. Select motors that are non-overloading within the full range of the pump performance curve.
 - D. Apply factory finish paint to assembled, tested units prior to shipping.
- 2.3 SEWAGE PUMP HIGH LEVEL ALARMS
 - A. Alarm: Remote type 120V single phase with NEMA 4X enclosure, terminal block, 5 amp isolated alarm contact, alarm horn, alarm light, test-automatic-silence switch and mechanical float switch.
- 2.4 SEWAGE EJECTORS
 - A. General Description: Pumps shall be duplex centrifugal, direct connected, floor mounted, single stage grinder type with cast iron body, stainless steel shaft, cast iron impeller, mechanical seal, permanently lubricated upper and lower ball bearings complete, control panel, mechanical float switch, and power cords with grounds.
 - B. Casing: Cast iron with integral cast-iron legs to elevate the pump to permit flow into the impeller. Pump casing, volute and impeller shall pass a 2" diameter sphere. Vertical discharge with screwed female connection and rail retrieval system.
 - C. Rail Retrieval System: Provide with cast iron floor elbow, gasket, anchor bolts, yoke, pipe guides, stainless steel rope, and upper guide bracket.
 - D. Impeller: Statically and dynamically balanced, open or semiopen, overhung, single suction, fabricated from cast iron, keyed to shaft and secured by a locking capscrew.
 - E. Grinder shall be a 440c stainless steel rotating cutter attached to the motor shaft with stationary shredder ring attached to the pump inlet.
 - F. Pump and Motor Shaft: Stainless steel, with factory-sealed, upper and lower grease-lubricated ball bearings.
 - G. Seals: Tandem mechanical seals mounted in cast iron body seal chamber with upper seal of carbon rotating ring, stainless-steel spring, ceramic seat, and Buna-N bellows and gasket and lower seal of silicon carbide rotating ring, stainless-steel spring, silicon carbide seat, and Buna-N bellows and gasket.
 - H. Motor: Hermetically sealed, with built-in overload protection, air filled, 1750 RPM, NEMA class B insulation capable of a maximum continuous operating temperature of 120F, 3-conductor and waterproof cable.
 - I. Cover: Epoxy coated steel or aluminum gasketed cover conduits.
 - J. Controls: NEMA 4 enclosure with vandal resistant double door dead front with lockable through door disconnect, lockable combination circuit breaker magnetic motor starter and 3 leg overload protection for each motor, internal test-off-automatic selector switches, overload relays and indicator lights, resets, 120V control circuit transformers fused on primary and secondary, automatic alternator for alternating lead-lag pump selection and to provide for both pumps to operate simultaneously under high level condition, hour meter for each pump, high level alarm horn and light with test-off-automatic switch, overload alarm light and contact for each pump, auxiliary alarm contacts for each alarm condition and terminal board for connection of lines, pumps, and level sensors. Circuit breakers shall have minimum AIC rating as indicated on the Electrical Drawings. Control panel shall have a unit short circuit current rating equal to or greater than the available short circuit current as indicated on the electrical drawings. Controls shall be configured for terminating one incoming power feeder.

- K. Level Controls: Pole mounted tethered float switches with chord grips, pole mounting plate and cover. Float switches shall be 120V 3 amp single pole normally open that closes on the rise for pump "off", first pump "on" second pump "on" and high level alarm.
- L. Junction Box: NEMA 6P enclose of fiberglass reinforced polyester with fully gasketed cover, terminal strip and inlets and outlets for four control and two power connections.
- M. Disconnect: Disconnect is provided under Division 26 Section "Enclosed Switches and Circuit Breakers".
- 2.5 BALL VALVES
 - A. Ball Valves, 2 Inch and Smaller: Meeting MSS SP 110, Class 150, 600-psi CWP; two-piece construction; with ASTM B 584 cast bronze, full port, blowout-proof stem and chrome-plated brass ball, with replaceable "Teflon" or "TFE" seats and seals, solder or threaded ends and vinyl-covered steel handle.
- 2.6 CHECK VALVES
 - A. Non Clog "Sinking Ball Type" Check Valves: Sinking ball type with cast iron body, steel ball with hollow core and Buna-N coating. Valve body shall be configured for unobstructed flow. Valves 2" and smaller with screwed ends.

PART 3 - EXECUTION

- 3.1 INSTALLATION
 - A. Install in accordance with manufacturer's installation instructions.
 - B. General: Comply with the manufacturer's written installation and alignment instructions.
 - C. Install pumps in locations and arrange to provide access for periodic maintenance, including removal of motors, impellers, couplings, and accessories.
 - D. Support pumps and piping separately so that the weight of the piping system does not rest on the pump.
- 3.2 EXAMINATION
 - A. Examine areas, equipment foundations, and conditions with Installer present, for compliance with requirements for installation and other conditions affecting performance of plumbing pumps. Do not proceed with installation until unsatisfactory conditions have been corrected.
 - B. Examine rough-in for plumbing piping systems to verify actual locations of piping connections prior to installation.

3.3 CONNECTIONS

- A. General: Install valves that are same size as the piping connecting the pump.
- B. Install discharge pipe sizes equal to or greater than the diameter of the pump nozzles. Sewage ejector discharge pipe material is specified in Division 22 Section "Sanitary Drainage and Vent Piping and Specialties".
- C. Install a non-clog check valve in an accessible location or where indicated on the drawings. Install a full port ball valve on the discharge side of sewage ejectors downstream of the check valve.
- D. Electrical wiring and connections are specified in Division 26 Section "Common Work Results for Electrical".
- E. Install sewage ejector inlets or outlets to fiberglass sump basins in the field at the required elevation. Cut inlet or outlet per the basin manufacturer's instructions, as installation requires with factory penetration kits at each penetration. See drawings for inlet and outlet elevations.
- F. Install sewage ejector inlets or outlets to sump basins in the field at the required elevation. Seal penetrations with mechanical link seals. Mechanical link seals are specified in Division 22 Section "Basic Piping Material and Methods." See drawings for inlet and outlet elevations.
- G. Coordinate interlock of sewage pump high level, two moisture sensor, two high temperature shutdown, and two overload alarms with building automation system. Alarm wiring and alarm interlock with the building automation system are specified in Division 23 Section "Direct-Digital Control for HVAC".

H. Coordinate interlock of sewage pump high level, two moisture sensor, two high temperature shutdown, two overload alarms, second pump running alarm, PLC failure alarm and level transmitter failure alarm with building automation system.

3.4 FIELD QUALITY CONTROL

- A. Pressure Testing: Perform a pressure test on the discharge assembly. The test pressure shall be twice that of the shut off head of the pump.
- B. Valve Testing: After piping systems have been tested and put into service, but before final adjusting and balancing, inspect valves for leaks. Adjust or replace packing to stop leaks; replace valves if leak persists.

3.5 STARTUP

- A. Final Checks Before Start-Up: Perform the following preventative maintenance operations and checks before start-up:
 - 1. Lubricate oil-lubricated bearings.
 - 2. Remove grease-lubricated bearing covers and flush the bearings with kerosene and thoroughly clean. Fill with new lubricant in accordance with the manufacturer's recommendations.
 - 3. Disconnect coupling and check motor for proper rotation. Rotation shall match direction of rotation marked on pump casing.
 - 4. Check that pump is free to rotate by hand. For pumps handling hot liquids, pump shall be free to rotate with the pump hot and cold. If the pump is bound or even drags slightly, do not operate the pump until the cause of the trouble is determined and corrected.
- B. Starting procedure for pumps with shutoff power not exceeding the safe motor power:
 - 1. Prime the pump, opening the suction valve, closing the drains, and prepare the pump for operation.
 - 2. Start motor.
 - 3. Open the discharge valve slowly.
 - 4. Observe the leakage from the stuffing boxes and adjust the sealing liquid valve for proper flow to ensure the lubrication of the packing. Do not tighten the gland immediately, but let the packing run in before reducing the leakage through the stuffing boxes.
 - 5. Check the general mechanical operation of the pump and motor.
- C. If the pump is to be started against a closed check valve with the discharge shut-off valve open, the steps are the same except that the discharge shut-off valve is opened some time before the motor is started.

END OF SECTION 221329

GENERAL ELECTRICAL REQUIREMENTS

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 and to all following sections within Division 26.

1.2 SECTION INCLUDES

- A. This Division requires providing complete functioning systems, and each element thereof, as specified, indicated, or reasonably inferred, on the Drawings and in these Specifications, including every article, device, or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system's functioning as indicated by the design and the equipment specified. Elements of the Work include, but are not limited to, materials, labor, supervision, supplies, tools, equipment, transportation and utilities.
- B. Division 26 of these Specifications, and Drawings numbered with prefixes E, generally describe these systems, but the scope of the electrical work includes all such work indicated in all of the Contract Documents, including, but not limited to: Instructions to Bidders; Proposal Form; General Conditions; Supplementary General Conditions; Architectural, Structural, Mechanical, Plumbing and Electrical Drawings and Specifications; and Addenda.
- C. Drawings are graphic representations of the Work upon which the Contract is based. They show the materials and their relationship to one another, including sizes, shapes, locations, and connections. They also convey the scope of work, indicating the intended general arrangement of the equipment, fixtures, outlets and circuits without showing all of the exact details as to elevations, offsets, control lines, and other installation requirements. Use the Drawings as a guide when laying out the Work and to verify that materials and equipment will fit into the designated spaces, and which, when installed per manufacturers' requirements, will ensure a complete, coordinated, satisfactory and properly operating system.
- D. Specifications define the qualitative requirements for products, materials, and workmanship upon which the Contract is based.

1.3 DEFINITIONS

- A. Whenever used in these Specifications or Drawings, the following terms shall have the indicated meanings:
 - 1. Furnish: "To supply and deliver to the project site, ready for unloading, unpacking, assembling, installing, and similar operations."
 - 2. Install: "To perform all operations at the project site, including, but not limited to, and as required: unloading, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, testing, commissioning, starting up and similar operations, complete, and ready for the intended use."
 - 3. Provide: "To furnish and install complete, and ready for the intended use."
 - 4. Furnished by Owner (or Owner-Furnished) or Furnished by Others: "An item furnished by the Owner or under other Divisions or Contracts, and installed under the requirements of this Division, complete, and ready for the intended use, including all items and services incidental to the Work necessary for proper installation and operation. Include the installation under the warranty required by this Division.
 - 5. Engineer: Where referenced in this Division, "Engineer" is the Engineer of Record and the Design Professional for the Work under this Division.
 - a. A Consultant to, and an authorized representative of, the Owner, as defined in the General and/or Supplementary Conditions. When used in this Division, it means increased involvement by, and obligations to, the Engineer, in addition to involvement by, and obligations to, the "Owner".

- 6. Contract Administrator: Where referenced in this Division, "Contract Administrator" is the primary liaison between the Owner and the Contractor. Specifically, for this project this is the "Owner's Representative".
- 7. AHJ: The local code and/or inspection agency (Authority) Having Jurisdiction over the Work.
- 8. NRTL: Nationally Recognized Testing Laboratory, as defined and listed by OSHA in 29 CFR 1910.7 (e.g., UL, ETL, CSA, etc.), and acceptable to the Authority having Jurisdiction (AHJ) over this project. Nationally Recognized Testing Laboratories and standards listed are used only to represent the characteristics required and are not intended to restrict the use of other NRTLs that are acceptable to the AHJ, and standards that meet the specified criteria.
- 9. Substitution: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor. Substitutions include Value Engineering proposals.
 - a. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - b. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.
- 10. Value Engineering: A systematic method to improve the "value" of goods and services by using an examination of function. Value, as defined, is the ratio of function to cost. Value can therefore be increased by either improving the function or reducing the cost. The goal of VE is to achieve the desired function at the lowest overall cost consistent with required performance.
- 11. Basis-of-Design Product: Subject to compliance with requirements, provide either the named product or a comparable product by one of the other equivalent manufacturers specified
- B. When 'furnish', 'install', 'perform', or 'provide' is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.
- C. The terms "approved equal", "equivalent", or "equal" are used synonymously and shall mean "accepted by or acceptable to the Engineer as equivalent to the item or manufacturer specified". The term "approved" shall mean labeled, listed, or both, by an NRTL, and acceptable to the AHJ over this project.
- D. Manufacturers: The listing of specific manufacturers does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed are not relieved from meeting these specifications in their entirety.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
 - 3. Where a list is provided, manufacturers are listed alphabetically and not in accordance with any ranking or preference, unless otherwise noted.
- E. The following definitions apply to excavation operations:
 - 1. Additional Excavation: Where excavation has reached indicated sub-grade elevations, if unsuitable bearing materials are encountered, continue excavation until suitable bearing materials are reached. The Contract Sum may be adjusted by an appropriate Contract Modification.
 - 2. Sub-base: as used in this section refers to the compacted soil layer used in pavement systems between the sub-grade and the pavement base course material.
 - 3. Sub-grade: as used in this section refers to the compacted soil immediately below the slab or pavement system.
 - 4. Unauthorized excavation consists of removal of materials beyond indicated sub-grade elevations or dimensions without specific direction from the Contract Administrator.

1.4 REFERENCE STANDARDS

- A. Execute all work in accordance with, and comply at a minimum with, National Fire Protection Association (NFPA) codes, state and local building codes, and all other applicable codes and ordinances in force, governing the particular class of work involved, for performance, workmanship, equipment, and materials. Additionally, comply with rules and regulations of public utilities and municipal departments affected by connection of services. Where conflicts between various codes, ordinances, rules, and regulations exist, comply with the most stringent. Wherever requirements of these Specifications, Drawings, or both, exceed those of the above items, the requirements of these Specifications, Drawings, or both, shall govern. Code compliance, at a minimum, is mandatory. Construe nothing in these Construction Documents as permitting work not in compliance, at a minimum, with these codes. Bring all conflicts observed between codes, ordinances, rules, regulations and these documents to the Contract Administrator's and Engineer's attention in sufficient time, prior to the opening of bids, to prepare the Supplementary Drawings and Specifications Addenda required to resolve the conflict.
- B. If the conflict is not reported timely, prior to the opening of bids, resolve the conflict and provide the installation in accordance with the governing codes and to the satisfaction of the Contract Administrator and Engineer, without additional compensation. Contractor will be held responsible for any violation of the law.
- C. Obtain timely inspections by the constituted authorities having jurisdiction; and, upon final completion of the Work, obtain and deliver to the Owner executed final certificates of acceptance from these authorities having jurisdiction.
- D. All material, manufacturing methods, handling, dimensions, methods of installation, and test procedures shall conform to industry standards, acts, and codes, including, but not limited to the following, except where these Drawings and Specifications exceed them:

IBC	International Building Code
ADA	Americans with Disabilities Act
AEIC	Association of Edison Illuminating Companies
ANSI	American National Standards Institute
ASTM	American Society of Testing Materials
AWS	American Welding Society
AWWA	American Water Works Association
ICEA	Insulated Conductors Engineers Association
IEEE	Institute of Electrical and Electronics Engineers
IES	Illuminating Engineering Society
NBFU	National Board of Fire Underwriters
NEC	National Electrical Code, NFPA 70
NECA	National Electrical Contractors Association
NEMA	National Electrical Manufactures' Association
NETA	InterNational Electrical Testing Association
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Act
UL	Underwriter's Laboratories

- E. Comply with rules and regulations of public utilities and municipal departments affected by connections of services.
- F. Perform all electrical work in compliance with applicable safety regulations, including OSHA regulations. All safety lights, guards, and warning signs required for the performance of the electrical work shall be provided by the Contractor.
- G. Obtain and pay for all permits, licenses and fees that are required by the governing authorities for the performance of the electrical work.
- 1.5 ADMINISTRATIVE REQUIREMENTS
 - A. Coordinate with other divisions for electrical work included in them but not listed in Division 26 or indicated on electrical Drawings.
 - B. Visit the site and ascertain the conditions to be encountered in installing the Work under this Division, verify all dimensions and locations before purchasing equipment or commencing work, and make due provisions for same in the bid. Failure to comply with this requirement shall not

be considered justification for omission, alteration, and incorrect or faulty installation of any of the Work under this Division or for additional compensation for any work covered by this Division.

- C. Refer to Drawings and divisions of the other trades and to relevant equipment drawings and shop drawings to determine the extent of clear spaces. Make all offsets required to clear equipment, beams and other structural members, and to facilitate concealing conduit in the manner anticipated in the design.
- D. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
- E. Provide materials with trim that will fit properly the types of ceiling, wall, or floor finishes installed.
- F. Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
- G. Maintain an electrical foreman on the jobsite at all times to coordinate this work with other trades so that various components of the electrical systems is installed at the proper time, fits the available space, and allows proper service access to all equipment. Carry on the Work in such a manner that the Work of the other trades will not be handicapped, hindered, or delayed at any time.
- H. Work of this Division shall progress according to the "Construction Schedule" as described in Division 01 and as approved by the Contract Administrator. Cooperate in establishing these schedules and perform the Work under this Division, in a timely manner in conformance with the construction schedule so as to ensure successful achievement of all schedule dates.
- 1.6 MEASUREMENTS AND LAYOUTS:
 - A. The Drawings are schematic in nature but show the various components of the systems approximately to scale and attempt to indicate how they are to be integrated with other parts of the Work. Figured dimensions take precedence to scaled dimensions. Determine exact locations by job measurements, by checking the requirements of other trades, and by reviewing all Contract Documents. Correct, at no additional costs to the Owner, errors that could have been avoided by proper checking and inspection.
 - 1. Where the Engineer's digital data files are provided to the Contractor for use in preparing coordination digital data files, the Engineer makes no representations as to the accuracy or completeness of digital data files as they relate to the Drawings or Specifications.

1.7 SUBMITTALS

- A. Refer to Division 01 and General Conditions for submittal requirements in addition to requirements specified herein.
- B. Refer to Division 01 for acceptance of electronic submittals. If not specified by Division 01, provide electronic submittals. If Division 01 requires paper submittals, provide the quantity of submittals required, but no fewer than seven (7) sets.
- C. For electronic submittals, Contractor shall submit the documents in accordance with this Section and the procedures specified in Division 01. Contractor shall notify the Architect and Engineer that the submittals have been posted. If electronic submittal procedures are not defined in Division 01, Contractor shall include the website, username and password information needed to access the submittals. For submittals sent by e-mail, Contractor shall copy the Architect and Engineer's designated representatives. Contractor shall allow for the Engineer Review Time as specified. Contractor shall submit only the documents required to purchase the materials and/or equipment in the submittal.
- D. Engineer Review Time: Transmit submittals as early as required to support the project schedule. Allow two weeks for Engineer review time plus to/from mailing time via the Architect, plus a duplication of this time for resubmittal if required. Transmit submittals as soon as possible after Notice to Proceed and before Mechanical construction starts.
- E. Submittals and shop drawings shall not contain the firm name, logo, seal, or signature of the Engineer. They shall not be copies of the work product of the Engineer. If the Contractor desires to use elements of such product, the license agreement for transfer of information obtained from the Engineer must be used.

- F. Assemble and submit for review manufacturer product literature for material and equipment to be furnished and/or installed under this Division. Literature shall include shop drawings, manufacturer product data, performance sheets, samples, and other submittals required by this Division as noted in each individual Section. General product catalog data not specifically noted to be part of the specified product will be rejected and returned without review.
- G. Separate submittals according to individual specification sections. Only resubmit those sections requested for resubmittal.
- H. Provide submittals in sufficient detail so as to demonstrate compliance with these Contract Documents and the design concept. Highlight, mark, list or indicate the materials, performance criteria and accessories that are being proposed. Illegible submittals will be rejected and returned without review.
- I. Refer to individual Sections for additional submittal requirements.
- J. Before transmitting submittals and material lists, verify that the equipment submitted is mutually compatible with and suitable for the intended use. Verify that the equipment will fit the available space and maintain manufacturer recommended service clearances. If the size of equipment furnished makes necessary any change in location, or configuration, submit a shop drawing showing the proposed layout.
- K. Submittals shall contain the following information:
 - 1. The project name.
 - 2. The applicable specification section and paragraph.
 - 3. Equipment identification acronym as used on the drawings.
 - 4. The submittal date.
 - 5. The Contractor's stamp, which shall certify that the stamped drawings have been checked by the Contractor, comply with the Drawings and Specifications, and have been coordinated with other trades.
 - 6. Submittals not so identified will be returned to the Contractor without action.
- L. The checking and subsequent acceptance by the Engineer and/or Contract Administrator of submittals shall not relieve responsibility from the Contractor for (1) deviations from Drawings and Specifications; (2) errors in dimensions, details, sizes of equipment, or quantities; (3) omissions of components or fittings; and (4) not coordinating items with actual building conditions and adjacent work. Contractor shall request and secure written acceptance from the Engineer and Architect prior to implementing any deviation.

1.8 SUBSTITUTIONS

- A. Refer to Division 01 and General Conditions for substitutions in addition to requirements specified herein.
- B. Materials, products, equipment, and systems described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by the proposed substitution.
- C. The base bid shall include only the products from manufacturers specifically named in the drawings and specifications.
- D. Request for Substitution:
 - 1. Complete and send the Substitution Request Form attached at the end of this section for each material, product, equipment, or system that is proposed to be substituted.
 - 2. The burden of proof of the merit of the proposed substitution is upon the proposer.
 - 3. Unless stated otherwise in writing to the Engineer by the Contractor, Contractor warrants to the Engineer, Contract Administrator, and Owner the following:
 - a. Proposed substitution has been fully investigated and determined to meet or exceed the specified Work in all respects.
 - b. Proposed substitution is consistent with the Contract Documents and will produce indicated results, including functional clearances, maintenance service, and sourcing of replacement parts.
 - c. Proposed substitution has received necessary approvals of the Authorities Having Jurisdiction.

- d. Same warranty will be furnished for proposed substitution as for specified Work.
- e. If accepted substitution fails to perform as required, Contractor shall replace substitute material or system with that originally specified and bear costs incurred thereby.
- f. Coordination, installation and changes in the Work as necessary for accepted substitution will be complete in all respects.
- E. Substitution Consideration:
 - 1. No substitutions will be considered unless the Substitution Request Form is completed and attached with the appropriate substitution documentation.
 - 2. Prior to receipt of Bids: No substitutions will be considered prior to receipt of bids unless written request for approval to bid has been received by the Engineer at least ten (10) calendar days prior to the date for receipt of bids.
 - a. If the proposed substitution is approved prior to receipt of bids, such approval will be stated in an addendum. Bidders shall not rely upon approvals made in any other manner. Verbal approval will not be given.
 - 3. After receipt of Bids: No substitutions will be considered after receipt of Bids and before award of the Contract.
 - 4. After award of Contract: No substitutions will be considered after the Contract is awarded unless specifically provided in the Contract Documents.

1.9 ELECTRONIC DRAWING FILES

- A. In preparation of shop drawings or record drawings, Contractor may, at their option, obtain electronic drawing files in AutoCAD or DXF format from the Engineer for a shipping and handling fee of \$200 for a drawing set up to 12 sheets and \$15 per sheet for each additional sheet.
- B. Contractor shall request and complete the Electronic File Release Agreement form from the Engineer. Send the form along with a check made payable to Henderson Engineers, Inc. Contractor shall indicate the desired shipping method and drawing format on the attached form.
- C. Contact the Contract Administrator for written authorization.
- D. The following must be received before electronic drawing files will be sent:
 - 1. Contract Administrator's written authorization
 - 2. Engineer's release agreement form
 - 3. Payment

1.10 QUALITY ASSURANCE

- A. Execute all work under this Division in a thorough and professional manner by competent and experienced workmen duly trained to perform the work specified.
- B. Install all work in strict conformance with all manufacturers' requirements and recommendations, unless these Documents exceed those requirements. Install all equipment and materials in a neat and professional manner, aligned, leveled, and adjusted for satisfactory operation, in accordance with NECA guidelines.
- C. Unless indicated otherwise on the Drawings, provide all material and equipment new, of the best quality and design, free from defects and imperfections and with markings or a nameplate identifying the manufacturer and providing sufficient reference to establish quality, size and capacity. Provide all material and equipment of the same type from the same manufacturer whenever practicable.
- D. Unless specified otherwise, manufactured items of the same types specified within this Division shall have been installed and used, without modification, renovation, or repair for not less than one year prior to date of bidding for this Project.

1.11 OPERATION AND MAINTENANCE MANUALS

- A. Refer to Division 01 and General Conditions for Operation and Maintenance Manuals in addition to requirements specified herein.
- B. Submit manuals prior to requesting the final punch list and before all requests for Substantial Completion.

- C. Instruct the Owner's permanent personnel in the proper operation of, startup and shutdown procedures and maintenance of the equipment and components of the systems installed under this Division.
- D. Prior to Substantial Completion of the project, furnish the Operation and Maintenance Manuals to the Contract Administrator, for Engineer's review, and for the Owner's use.
 - 1. Refer to Division 01 for acceptance of electronic manuals for this project. If not specified in Division 1, provide manuals in the form of a multiple file composite electronic PDF file for each manual type required. Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size. 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.
 - a. Contractor shall notify the Contract Administrator and Engineer that the manuals have been posted. If electronic manual procedures are not defined in Division 01, Contractor shall include the website, username and password information needed to access the manuals. For manuals sent by e-mail, Contractor shall copy the Contract Administrator's and Engineer's designated representatives.
 - 2. If Division 01 requires paper manuals, provide four (4) copies of Operation and Maintenance Manuals in labeled, hard-back three-ring binders, with cover, binding label, tabbed dividers and plastic insert folders for Record Drawings.
- E. Each manual shall contain equipment data, approved submittals, shop drawings, diagrams, capacities, spare part numbers, manufacturer service and maintenance data, warranties and guarantees. Include local contacts, complete with address and telephone number, for equipment, apparatus, and system components furnished and installed under this Division of the specifications.

1.12 SPARE PARTS

A. Provide to the Owner the spare parts specified in the individual sections of this Division

1.13 RECORD DRAWINGS

- A. Refer to Division 01 and General Conditions for Record Drawings in addition to requirements specified herein.
- B. A set of work prints of the Contract Documents shall be kept on the jobsite during construction for the purpose of noting changes. During the course of construction, the Contractor shall indicate on these Documents changes made from the original Contract Documents. Particular attention shall be paid to those items which need to be located for servicing. Underground utilities shall be located by dimension from column lines.
- C. At the completion of the project, the Contractor shall obtain, at their expense, reproducible copies of the final drawings and incorporate changes noted on the jobsite work prints onto these drawings. These changes shall be done by a skilled drafter. Each sheet shall be marked "Record Drawing", along with the date. These drawings shall be delivered to the Contract Administrator.

1.14 DELIVERY, STORAGE AND HANDLING

- A. Refer to Division 01 and General Conditions for Delivery, Storage and Handling in addition to requirements specified herein.
- B. Deliver equipment and material to the job site in their original containers with labels intact, fully identified with manufacturer's name, make, model, model number, type, size, capacity and Underwriter's Laboratories, Inc. labels and other pertinent information necessary to identify the item.
- C. Deliver, receive, handle and store equipment and materials at the job site in the designated area and in such a manner as to prevent equipment and materials from damage and loss. Store equipment and materials delivered to the site on pallets and cover with waterproof, tear resistant tarp or plastic or as required to keep equipment and materials dry. Follow manufacturer's recommendations, and at all times, take every precaution to properly protect equipment and material from damage, including the erection of temporary shelters to adequately protect

equipment and material stored at the Site. Equipment and/or material which becomes rusted or damaged shall be replaced or restored by the Contractor to a condition acceptable to the Contract Administrator.

D. Be responsible for the safe storage of tools, material and equipment.

1.15 WARRANTIES

- A. Refer to Division 01 and General Conditions for Warranties in addition to requirements specified herein.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
- C. Warrant each system and each element thereof against all defects due to faulty workmanship, design or material for a period of 12 months from date of Substantial Completion, unless specific items are noted to carry a longer warranty in these Construction Documents or manufacturer's standard warranty exceeds 12 months. Remedy all defects, occurring within the warranty period(s), as stated in the General Conditions and Division 01.
- D. Also warrant the following additional items:
 - 1. All raceways are free from obstructions, holes, crushing, or breaks of any nature.
 - 2. All raceway seals are effective.
 - 3. The entire electrical system is free from all short circuits and unwanted open circuits and grounds.
- E. The above warranties shall include labor and material. Make repairs or replacements without any additional costs to the Owner.
- F. Perform the remedial work promptly, upon written notice from the Contract Administrator or Owner.
- G. At the time of Substantial Completion, deliver to the Owner all warranties, in writing and properly executed, including term limits for warranties extending beyond the one year period, each warranty instrument being addressed to the Owner and stating the commencement date and term.

1.16 TEMPORARY FACILITIES

- A. Refer to Division 01 and General Conditions for Temporary Facilities requirements in addition to requirements specified herein.
- B. Temporary Utilities: The types of services required include, but are not limited to, electricity, telephone, and internet. When connecting to existing franchised utilities for required services, comply with service companies' recommendations on materials and methods, or engage service companies to install services. Locate and relocate services (as necessary) to minimize interference with construction operations.
- C. Construction Facilities: Provide facilities reasonably required to perform construction operations properly and adequately.
 - 1. Enclosures: When temporary enclosures are required to ensure adequate workmanship, weather protection and ambient conditions required for the work, provide fire-retardant treated lumber and plywood; provide tarpaulins with UL label and flame spread of 15 or less; provide translucent type (nylon reinforced polyethylene) where daylighting of enclosed space would be beneficial for workmanship, and reduce use of temporary lighting.
 - 2. Heating: Provide heat, as necessary, to protect work, materials and equipment from damage due to dampness and cold. In areas where building is occupied, maintain a temperature not less than 65 degrees F. Use steam, hot water, or gas from piped distribution system where available. Where steam, hot water or piped gas are not available, heat with self-contained LP gas or fuel oil heaters, bearing UL, FM or other approval labels appropriate for application. Use electric-resistance space heaters only where no other, more energy-efficient, type of heater is available and allowable.
 - a. Vent and exhaust fuel-burning heaters per SMACNA Guidelines for Source Control and equip units with individual-space thermostatic controls.
 - b. If permanent HVAC systems are used during construction, provide HVAC Protection and replace all filtration prior to occupancy in accordance with SMACNA Guidelines.

LPS Liberty North High School	GENERAL ELECTRICAL REQUIREMENTS
Liberty, MO	260010-8

1.17 FIELD CONDITIONS

- A. Conditions Affecting Work In Existing Buildings: The following project conditions apply:
 - 1. The Drawings describe the general nature of remodeling to the existing building; however, visit the site prior to submitting bid to determine the nature and extent of work involved.
 - 2. Schedule work in the existing building with the Owner.
 - 3. Remove articles that are not required for the new work. Unless otherwise indicated, remove each item removed during this demolition from the premises and dispose in accordance with applicable federal, state and local regulations.
 - 4. Finish material will be installed under other divisions.
 - 5. Obtain permission from the Contract Administrator for roof penetrations and channeling of floors or walls not specifically noted on the Drawings.
 - 6. Protect adjacent materials indicated to remain. For work specific to this Division, install and maintain dust and noise barriers to keep dirt, dust, and noise from being transmitted to adjacent areas. Remove protection and barriers after demolition operations are complete.
 - 7. Locate, identify, and protect electrical services passing through demolition area and serving other areas outside the demolition limits. Maintain services to areas outside demolition limits. When services must be interrupted, provide temporary services for affected areas.]
- B. Conditions Affecting Excavations: The following project conditions apply:
 - 1. Maintain and protect existing building services that transit the area affected by selective demolition.
 - 2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by excavation operations.
- C. Site Information: Subsurface conditions were investigated during the design of the Project. Reports of these investigations are available for information only; data in the reports are not intended as representations or warranties of accuracy or continuity of conditions. The Owner will not be responsible for interpretations or conclusions drawn from this information.
- D. Use of explosives is not permitted
- E. Environmental Conditions: Apply joint sealers under temperature and humidity conditions within the limits specified by the joint sealer manufacturer. Do not apply joint sealers to wet substrates.

PART 2 - PRODUCTS AND MATERIALS

(Not Used)

PART 3 - EXECUTION

- 3.1 INSTALLATION, GENERAL
 - A. Install in accordance with manufacturer's instructions.
- 3.2 EXISTING CONDITIONS
 - A. Existing conditions indicated on the Drawings are taken from the best information available from the Owner, existing record drawings, and from limited, in-situ, visual site observations; and, they are not to be construed as "AS BUILT" conditions. The information is shown to help establish the extent of the new work.
 - B. Verify all actual existing conditions at the project site and perform the Work as required to meet the existing conditions and the intent of the Work indicated.
 - C. Notify Contract Administrator immediately of any dangerous conditions that exist on the job site, as they are discovered, before demolition, during selective demolition or before remodel work begins.
- 3.3 WORK IN EXISTING FACILITIES
 - A. The Drawings describe the general nature of remodeling to the existing facilities; however, visit the site prior to submitting a bid, to determine the nature and extent of work involved.

- B. Schedule work in the existing facility with the Owner.
- C. Certain demolition work shall be performed prior to the remodeling. Perform the demolition that involves electrical systems, fixtures, conduit, wiring, equipment, equipment supports or foundations and materials.
- D. Remove all of these articles that are not required for the new work. Unless otherwise indicated, each item removed during this demolition shall be removed from the premises and disposed of in accordance with all state and local regulations.
- E. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner, or others, unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
 - 1. Notify Contract Administrator and the Owner no fewer than 7 days in advance of proposed interruption of electrical service.
 - 2. Do not proceed with interruption of electrical service without Contract Administrator and the Owner's written permission.
 - 3. Owner reserves the right to require Contractor to cease work in any area Owner requires access to on an emergency basis.
 - 4. Make every effort to schedule outages during non-business or off-peak business hours to minimize disruptions to business operations.
- F. Relocate and reconnect all electrical facilities that must be relocated in order to accomplish the remodeling shown in the Drawings or indicated in the Specifications. Where electrical fixtures or equipment are removed, cap all unused raceways behind the floor line or wall line to facilitate restoration of finish, and, remove all existing wiring from abandoned raceways.
- G. Finish materials are specified in other divisions.
- H. Where removal of existing wiring interrupts electrical continuity of circuits that are to remain in use, provide necessary wiring, raceways, junction boxes, etc., to ensure continued electrical continuity.
- I. Penetrate roofs, channel walls and floors as required to produce the desired result; however, obtain permission from the Contract Administrator for all penetrations and channeling not specifically noted on the Drawings.
- J. Provide new, typewritten card directory for distribution equipment (including but not limited to load centers, panelboards, switchboards and switchgear) where changes occur under this scope of work. Indicate exact loads served by each existing circuit breaker or switch. Where circuit designations are not specifically indicated on the Drawings, provide a unique identifier for each updated circuit within the directory.
- K. Coordinate work with Architectural phasing drawings to properly stage transitions of work to provide power to existing, new and temporary loads. Monitor loads on distribution system to ensure shifting of loads does not overload electrical equipment.
- L. Work in common areas, shafts or other Owner owned and/or operated spaces must be reviewed and approved by the Contract Administrator and Owner prior to commencement of the work.
 - 1. Contractor shall minimize any disruption and disturbances to other tenants. All work within other tenant spaces must be coordinated with and approved by the Landlord and Owner.

3.4 PERMITS

A. Secure and pay for all permits required in connection with the installation of the Electrical Work. Arrange with the various utility companies for the installation and connection of all required utilities for this facility and pay all charges associated therewith including connection charges and inspection fees, except where these services or fees are designated to be provided by others.

3.5 SELECTIVE DEMOLITION

- A. Refer to Division 01, Division 02, and General Conditions for Selective Demolition requirements in addition to the requirements specified herein.
- B. General: Demolish, remove, demount, and disconnect abandoned electrical materials and equipment indicated to be removed and not indicated to be salvaged or saved.

- C. Materials and Equipment To Be Salvaged: remove, demount, disconnect existing electrical materials and equipment indicated to be removed and salvaged, and deliver materials and equipment to the location designated for storage.
- D. Disposal and Cleanup: Remove from the site and legally dispose of demolished materials and equipment not indicated to be salvaged.
- E. Electrical Materials and Equipment: Demolish, remove, demount, and disconnect the following items:
 - 1. Inactive and obsolete raceways, fittings, supports and specialties, equipment, wiring, controls, fixtures, and insulation:
 - a. Raceways and outlets embedded in floors, walls, and ceilings may remain if such materials do not interfere with new installations. Cut embedded raceways to below finished surfaces, seal, and refinish surfaces as specified or as indicated on the Architectural Finish Drawings. Remove materials above accessible ceilings. Cap raceways allowed to remain.
 - b. Perform cutting and patching required for demolition in accordance with Division 01, General Conditions and "Cutting and Patching" portion of this Section in Division 26.

3.6 ACCESS TO EQUIPMENT

- A. Locate all pull boxes, junction boxes and controls to provide easy access for operation, service inspection and maintenance. Provide an access door where equipment or devices are located above inaccessible ceilings. Refer to Division 26 Section "Common Work Results for Electrical".
- B. Maintain all code required clearances and clearances required by manufacturers.

3.7 PENETRATIONS

- A. Unless otherwise noted as being provided under other divisions, provide sleeves, box frames, or both, for openings in floors, walls, partitions and ceilings for all electrical work that passes through construction. Refer to Division 26 Section "Common Work Results for Electrical".
- B. Provide sleeves, box frames, or both, for all conduit, cable, and busways that pass through masonry, concrete or block walls.
- C. The cutting of new and/or existing construction will not be permitted except by written approval of the Contract Administrator.
- 3.8 EXCAVATION AND BACKFILLING
 - A. Refer to Division 01, Division 02 and General Conditions for Excavation and Backfilling in addition to the requirements specified herein.
 - B. Perform excavation of every description, of whatever substance encountered and to the depth required in connection with the installation of the work under this division. Excavation shall be in conformance with applicable Divisions and sections of the Specifications.
 - C. Restore roads, alleys, streets and sidewalks damaged during this work to the satisfaction of Authorities Having Jurisdiction.
 - D. Do not excavate trenches close to walks or columns without prior consultation with the Contract Administrator.
 - E. Erect barricades around excavations, for safety, and place an adequate number of amber lights on or near the work and keep those burning from dusk to dawn. Be responsible for all damage that any parties may sustain in consequence of neglecting the necessary precautions in prosecuting the work.
 - F. Slope sides of excavations to comply with local, state, and federal codes and ordinances. Shore and brace as required for stability of excavation.
 - G. Shoring and Bracing: Establish requirements for trench shoring and bracing to comply with local, state, and federal codes and authorities. Maintain shoring and bracing in excavations regardless of time period excavations will be open.
 - 1. Remove shoring and bracing when no longer required. Where sheeting is allowed to remain, cut top of sheeting at an elevation of 30 inches below finished grade elevation.
 - H. Install sediment and erosion control measures in accordance with local codes and ordinances.
 - I. Dewatering: Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.

- 1. Do not allow water to accumulate in excavations. Remove water to prevent softening of bearing materials. Provide and maintain dewatering system components necessary to convey water away from excavations.
- 2. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey surface water to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches. In no case shall sewers be used as drains for such water.
- J. Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage.
 - 1. Locate and retain soil materials away from edge of excavations. Do not store within dripline of trees indicated to remain.
 - 2. Remove and legally dispose of excess excavated materials and materials not acceptable for use as backfill or fill.
- K. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.
- L. Backfilling and Filling: Place soil materials in layers to required subgrade elevations for each area classification listed below, using materials specified in Part 2 of this Section.
 - 1. Under walks and pavements, use a combination of subbase materials and excavated or borrowed materials.
 - 2. Under building slabs, use drainage fill materials.
 - 3. Under raceway and cables, use subbase materials where required over rock bearing surface and for correction of unauthorized excavation.
 - 4. For raceway and cables less than 30 inches below surface of roadways, provide 4-inch-thick concrete base slab support. After installation and testing of raceway and cables, provide a 4-inch thick concrete encasement (sides and top) prior to backfilling and placement of roadway subbase.
 - 5. Other areas use excavated or borrowed materials.
- M. Backfill excavations as promptly as work permits, but not until completion of the following:
 - 1. Inspection, testing, approval, and locations of underground utilities have been recorded.
 - 2. Removal of concrete formwork.
 - 3. Removal of shoring and bracing, and backfilling of voids.
 - 4. Removal of trash and debris.
- N. Placement and Compaction: Place backfill and fill materials in layers of not more than 8 inches in loose depth for material compacted by heavy equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
 - 1. For vertical and diagonal raceway installations, thoroughly support raceways from permanent structures or undisturbed earth at no less that 10-foot intervals, while placing backfill materials, so that raceways are not deflected, crushed, broken, or otherwise damaged by the backfill placement.
- O. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification specified below. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
- P. Place backfill and fill materials evenly adjacent to structures, piping, and equipment to required elevations. Prevent displacement of raceways and equipment by carrying material uniformly around them to approximately same elevation in each lift.
- Q. Compaction: Control soil compaction during construction, providing minimum percentage of density specified for each area classification indicated below:
 - Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density for soils which exhibit a well-defined moisture-density relationship (cohesive soils), determined in accordance with ASTM D 1557 and not less than the following percentages of relative density, determined in accordance with ASTM D 2049, for soils which will not exhibit a well-defined moisture-density relationship (cohesionless soils).

- a. Areas Under Structures, Building Slabs and Steps, Pavements: Compact top 12 inches of subgrade and each layer of backfill or fill material to 90 percent maximum density for cohesive material, or 95 percent relative density for cohesionless material.
- b. Areas Under Walkways: Compact top 6 inches of subgrade and each layer of backfill or fill material to 90 percent maximum density for cohesive material, or 95 percent relative density for cohesionless material.
- c. Other Areas: Compact top 6 inches of subgrade and each layer of backfill or fill material to 85 percent maximum density for cohesive soils, and 90 percent relative density for cohesionless soils.
- 2. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water. Apply water in minimum quantity necessary to achieve required moisture content and to prevent water appearing on surface during, or subsequent to, compaction operations.
- R. Subsidence: Where subsidence occurs at mechanical installation excavations during the period 12 months after Substantial Completion, remove surface treatment (i.e., pavement, lawn, or other finish), add backfill material, compact to specified conditions, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent areas.

3.9 CUTTING AND PATCHING

- A. Cut walls, floors, ceilings, and other portions of the facility as required to install work under this Division.
- B. Obtain permission from the Architect prior to cutting. Do not cut or disturb structural members without prior approval from the Architect and Structural Engineer.
- C. For post-tension slabs, x-ray slab and closely coordinate all core drill locations with Architect and Structural Engineer prior to performing any work. Obtain approval from Architect and Structural Engineer for all core drills and penetrations at least four days prior to performing work.
- D. Penetrations shall be made as small as possible while maintaining required clearances between the building element penetrated and the system component.
- E. Patch around openings to match adjacent construction, including fire ratings, if applicable.
- F. Repair and refinish areas disturbed by work to the condition of adjoining surfaces in a manner satisfactory to the Architect.

3.10 PAINTING

- A. Refer to Division 09 Section "Painting" for painting requirements.
- B. Paint exposed ferrous surfaces, including, but not limited to, hangers, equipment stands and supports using materials and methods as specified under individual sections and Division 09 of the Specifications; colors shall be as selected by the Contract Administrator.
- C. Re-finish all field-threaded ends of galvanized conduits and field-cut ends of galvanized supports with a cold-galvanizing compound approved for use on conductive surfaces. Follow closely manufacturer's instructions for pre-cleaning surfaces and application.
- D. Factory finishes and shop priming and special finishes are specified in the individual equipment Specification sections.
- E. Where factory finishes are provided and no additional field painting is specified, touch up or refinish, as required by, and to the acceptance of, the Contract Administrator, marred or damaged surfaces so as to leave a smooth, uniform finish. If, in the opinion of the Contract Administrator, the finish is too badly damaged to be properly re-finished, replace the damaged equipment or materials at no additional costs to the Owner.

3.11 CLEANING

- A. Remove dirt and refuse, resulting from the performance of the Work, from the premises as required to prevent accumulation. Cooperate in maintaining reasonably clean premises at all times.
- B. Immediately prior to the final inspection, the Electrical Contractor shall clean material and equipment installed under the Electrical Contract. Dirt, dust, plaster, stains, and foreign matter shall be removed from surfaces including components internal to equipment.
- C. Damaged finishes shall be touched-up and restored to their original condition

3.12 ADJUSTING, ALIGNING AND TESTING

- A. Adjust, align and test all electrical equipment furnished and/or installed under this Division.
- B. Check motors for alignment with drive and proper rotation, and adjust as required.
- C. Check and test protective devices for specified and required application, and adjust as required.
- D. Verify that completed wiring system is free from short circuits, unintentional grounds, low insulation impedances, and unintentional open circuits.
- E. After completion, perform tests for continuity, unwanted grounds, and insulation resistance in accordance with the requirements of NFPA 70 and NETA.
- F. Be responsible for the operation, service and maintenance of all new electrical equipment during construction and prior to acceptance by the Owner of the complete project under this Contract. Maintain all electrical equipment in the best operating condition including proper lubrication.
- G. Notify the Contract Administrator immediately of all operational failures caused by defective material, labor or both.
- H. Maintain service and equipment for all testing of electrical equipment and systems until all work is approved and accepted by the Owner.
- I. Keep a calibrated voltmeter and ammeter (true RMS type) available at all times. Provide service for test readings when and as required.
- J. Refer to individual sections for additional and specific requirements.

3.13 START-UP OF SYSTEMS

- A. Prior to start-up of electrical systems, check all components and devices, lubricate items appropriately, and tighten all screwed and bolted connections to manufacturers' recommended torque values using appropriate torque tools.
- B. Each power circuit shall be energized, tested and proved free of breaks, short-circuits and unwanted grounds.
- C. After all systems have been inspected and adjusted, confirm all operating features required by the Drawings and Specifications and make final adjustments as necessary.
- D. Demonstrate that all equipment and systems perform properly as designed per Drawings and Specifications.
- E. At the time of final review and tests of the power and lighting systems, all equipment and system components shall be in place and all connections at panelboards, switches, circuit breakers, and the like, shall be complete. All fuses shall be in place, and all circuits shall be continuous from point of service connections to all switches, receptacles, outlets, and the like.

3.14 TEST REPORTS

- A. Perform tests as required by these Specifications and submit the results to the Contract Administrator, for Engineer's review. Record the results, date and time of each test and the conditions under which the test was conducted. Include a copy of the finalized test results, with corrections made, in the operations and maintenance manuals. The tests shall establish the adequacy, quality, safety, and reliability for each electrical system installed. Notify the Contract Administrator and Engineer two working days prior to each test.
- B. For specific testing requirements of special systems, refer to the Specification section that describes that system. The Contractor shall provide the following to facilitate the testing of the electrical systems:
 - 1. Perform tests as described in the individual sections;
- C. Upon completing each test, record the results, date and time of each test and the conditions under which the test was conducted. Submit to the Contract Administrator, for Engineer's review, in duplicate, the test results for the following electrical items:
 - 1. Building service entrance voltage and amperes at each phase.
 - 2. Electrical service grounding conditions and grounding resistance.
 - 3. Proper phasing throughout the entire system.
 - 4. Voltages (phase-to-phase and phase-to-neutral) and amperes at each phase for each panelboard, switchboard, and the like.
 - 5. Phase voltages and amperes at each three-phase motor.
- 6. Test all wiring devices for electrical continuity and proper polarity of connections.
- D. Promptly correct all failures or deficiencies revealed by these tests in accordance with the manufacturer's recommendations and as determined by the Engineer.

3.15 SUBSTANTIAL COMPLETION REVIEW

- A. Prior to requesting a site observation for "CERTIFICATION OF SUBSTANTIAL COMPLETION", complete the following items:
 - 1. Submit complete Operation and Maintenance Data.
 - 2. Submit complete Record Drawings.
 - 3. Perform all required training of Owner's personnel.
 - 4. Turn over video recordings of training sessions to the Owner.
 - 5. Turn over all spares and extra materials to the Owner, along with a complete inventory of spares and extra materials being turned over.
 - 6. Perform start-up tests of all systems.
 - 7. Remove all temporary facilities from the site.
 - 8. Comply with all requirements for Substantial Completion in the Division 01 and General Conditions.
- B. Request in writing a review for Substantial Completion. Give the Contract Administrator at least seven (7) days notice prior to the review.
- C. State in the written request that the Contractor has complied with the requirements for Substantial Completion.
- D. Upon receipt of a request for review, the Contract Administrator will either proceed with the review or advise the Contractor of unfilled requirements.
- E. If the Contractor requests a site visit for Substantial Completion review prior to completing the above-mentioned items, he shall reimburse the Contract Administrator and Engineer for time and expenses incurred for the visit.
- F. Upon completion of the review, the Contract Administrator will prepare a "final list" of outstanding items to be completed or corrected for final acceptance.
- G. Omissions on the "final list" shall not relieve the Contractor from the requirements of the Contract Documents.
- H. Prior to requesting a final review, submit a copy of the final list of items to be completed or corrected. State in writing that each item has been completed, resolved for acceptance or the reason it has not been completed.

SUBSTITUTION REQUEST FORM

To Project Engineer:		Request # (GC Determined):				
Project Name:						
Project No/Phase:	Date:					
Specification Title:						
Section Number:	Page:	Article/Paragraph:				
Proposed Substitution:						
Manufacturer:		Model No.:				
Address:	Address: Phone:					
History: 🗌 New product 🛛	1-4 years old 🛛 🗌 5-10	years old 🛛 🗌 More than 10 years old				
Differences between proposed	substitution and specifie	d Work:				
Point-by-point comparative of Comparative data may include visual effect, sustainable design Include all information necessa Supporting Data Attached:	data attached – REQUIR but not be limited to perf n characteristics, warran ry for an evaluation.	ED BY ENGINEER ormance, certifications, weight, size, durability, ties, and specific features and requirements.				
Reason for not providing specif	ied item:					
Similar Installation: Project:		Architect:				
Address:		Owner:				
		Date Installed:				
Proposed substitution affects of	ther parts of Work:	□ No □ Yes; explain:				

Substitution Certification Statement:

Unless stated otherwise in writing to the Engineer by the Contractor, Contractor warrants to the Engineer, Architect, and Owner that the:

- A. Proposed substitution has been fully investigated and determined to meet or exceed the specified Work in all respects.
 - B. Proposed substitution is consistent with the Contract Documents and will produce indicated results.
 - C. Proposed substitution does not affect dimensions and functional clearances.
 - D. Proposed substitution has received necessary approvals of authorities having jurisdiction.
 - E. Same warranty will be furnished for proposed substitution as for specified Work.
 - F. Same maintenance service and source of replacement parts, as applicable, is available.
 - G. Proposed substitution will not adversely affect other trades or delay construction schedule.
 - H. Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitting Contractor

Date

Company

Manufacturer's Certification of Equal Quality:

I ______ represent the manufacturer of the Proposed Substitution item and hereby certify and warrant to Architect, Engineer, and Owner that the function and quality of the Proposed Substitution meets or exceeds the Specified Item.

	Manufacturer's Representative		Date	Company
Engine	er Review and Recommendation	on Section		
	Recommend Acceptance	🗌 Yes	🗆 No	
	Additional Comments:	Attached	🗌 None	
Accept	ance Section: Contractor Acceptance Sig	gnature	Date	Company
	Owner Acceptance Signature		Date	Company
	Architect Acceptance Signature		Date	Company
	Engineer Acceptance Sig	nature	Date	Company

SECTION 260500

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. This Section includes limited scope general construction materials and methods, electrical equipment coordination, and common electrical installation requirements as follows:
 - 1. Access doors in walls, ceilings, and floors for access to electrical materials and equipment.
 - 2. Sleeves and seals for electrical penetrations.
 - 3. Joint sealers for sealing around electrical materials and equipment, and for sealing penetrations in fire and smoke barriers, floors, and foundation walls.
 - 4. Sealing penetrations through noise critical spaces.
- 1.2 DEFINITIONS
 - A. The following abbreviations apply to this and other Sections of these Specifications:
 - 1. AHJ: Authority(ies) having Jurisdiction
 - 2. ATS: Acceptance Testing Specifications
 - 3. EPDM: Ethylene-propylene-diene monomer rubber
 - 4. MC: Metal Clad
 - 5. N/A: Not Available or Not Applicable
 - 6. NBR: Acrylonitrile-butadiene rubber
 - 7. NRTL: Nationally Recognized Testing Laboratory
 - 8. PCF: Pounds per Cubic Foot
 - B. The following definitions apply to this and other Sections of these Specifications:
 - 1. Homerun: That portion of an electrical circuit originating at a junction box, termination box, receptacle or switch with termination at an electrical panelboard. Note: Where MC Cable is utilized for receptacle and/or lighting branch circuiting loads, the originating point of the homerun shall be at the first load in the circuit or at a junction box in an accessible ceiling space immediately above the first load.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate arrangement, mounting, and support of electrical equipment:
 - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 - 3. To allow right of way for piping, ducts, and other systems installed at required slopes and/or elevations.
 - 4. So connecting raceways, cables, and wireways will be clear of obstructions and of the working and access space of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed.
- D. Coordinate electrical testing of electrical, mechanical, and architectural items, so equipment and systems that are functionally interdependent are tested to demonstrate successful interoperability.
- 1.4 SUBMITTALS
 - A. General: Submit the following in accordance with Division 01 and Division 26 Section "General Electrical Requirements":

- 1. Product data for the following products:
 - a. Sleeve seals.
 - b. Through and membrane penetration firestopping systems.
 - c. Joint sealers
 - d. Acoustical sealers
 - e. Endothermic rap
- 2. Shop drawings for:
 - a. Detailed fabrication drawings of access panels and doors.
- 3. Through and Membrane Penetration Firestopping Systems Product Schedule: Provide UL listing, location, wall or floor rating and installation drawing for each penetration fire stop system.
 - a. Where Project conditions require modification to qualified testing and inspecting agency's illustrations for a particular firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fireprotection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.
 - b. Qualifications data for testing agency.
- 4. Endothermic Wrap drawings and system details: Provide UL listing, assembly rating and installation drawing for each case specific installation. Include installation instructions indicating layers of wrap required and securing method.
 - a. Where Project conditions require modifications to qualified testing and inspecting agency's installation requirements for a particular listed fire rated electrical circuit protective system, submit illustration with modifications marked and approved by Endothermic Wrap manufacturer's fire protection engineer as an engineering judgement or equivalent fire-resistive-rated assembly.
- 5. Record Drawings: Submit Record Drawings as required by Division 01 and Division 26
 - a. Accurately record actual locations of firestopped penetrations and access panel/door locations. Indicate dimensions from fixed structural elements.

PART 2 - PRODUCTS AND MATERIALS

2.1 ACCESS TO EQUIPMENT

- A. Manufacturers:
 - 1. Bar-Co., Inc.
 - 2. Elmdor Stoneman.
 - 3. JL Industries
 - 4. Jay R. Smith Mfg. Co.
 - 5. Karp Associates, Inc.
 - 6. Milcor
 - 7. Nystrom Building Products
 - 8. Wade
 - 9. Zurn
- 2.2 SLEEVES
 - A. Steel sleeves for raceways and cables:
 - 1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends and drip rings.
 - B. Cast iron wall pipe sleeves for raceways and cables:
 - 1. Manufacturers
 - a. Josam Mfg. Co.

- b. Smith (Jay R) Mfg. Co.
- c. Tyler Pipe/Wade Div.; Subs of Tyler Corp.
- d. Watts Industries, Inc.
- e. Zurn Industries, Inc.; Hydromechanics Div.
- 2. Cast-iron sleeve with integral clamping flange with clamping ring, and nuts for membrane flashing.
 - a. Underdeck Clamp: Clamping ring with setscrews.
- 3. Sleeves for rectangular openings: Galvanized sheet steel with minimum 0.052- or 0.138- inch thickness as indicated and of length to suit application.
- 4. Coordinate sleeve selection and application with selection and application of firestopping to be used.

2.3 SEALANTS

- A. SLEEVE SEALS
 - 1. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 - 2. Manufacturers:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. O-Z/Gedney
 - e. Pipeline Seal and Insulator, Inc.
 - 3. Sealing Elements: Interlocking or solid sealing links shaped or pre-drilled to fit surface of cable or raceway. Include type and number required for material and size of raceway or cable.
 - a. EPDM
 - b. NBR
 - c. Neoprene
 - 4. Pressure Plates: Include two for each sealing element. For multi-phase circuits, use slotted pressure plates if metal.
 - a. Plastic
 - b. Carbon steel
 - c. Stainless steel
 - d. PVC-coated steel
 - 5. Connecting Bolts and Nuts: Provide bolts of length required to secure pressure plates to sealing elements. Include one for each sealing element.
 - a. Carbon steel with corrosion-resistant coating
 - b. Stainless steel
- B. JOINT SEALERS
 - 1. General: Joint sealers, joint fillers, and other related materials compatible with each other and with joint substrates under conditions of service and application.
 - 2. Colors: As selected by the Contract Administrator from manufacturer's standard colors.
 - 3. Elastomeric Joint Sealers: Provide the following types:
 - a. Silicone Joint Sealants, One-part nonacid-curing, silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, for uses in non-traffic areas for masonry, glass, aluminum, and other substrates recommended by the sealant manufacturer. Provide one of the following:
 - 1) Dow Corning, Dowsil 790
 - 2) Dow Corning, Dowsil 795
 - 3) GE, Silglaze II SCS 2350

- 4) GE, Silpruf SCS 2000
- 5) Owens Corning, Energy Complete
- 6) Pecora, 864 NST
- 7) Tremco, Spectrem 1
- 8) Tremco, Spectrem 2
- b. Mildew Resistant Sealants, one-part mildew-resistant, silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, for uses in non-traffic areas for glass, aluminum, metal or porcelain plumbing fixtures and nonporous joint substrates; formulated with fungicide; intended for sealing interior joints with nonporous substrates; and subject to in-service exposure to conditions of high humidity and temperature extremes. Provide one of the following:
 - 1) Dow Corning, Dowsil 786
 - 2) GE, Momentum SCS 1700
 - 3) Pecora, 898 Silicone NST
- c. Hybrid Joint Sealants: One-part, nonsag, paintable complying with ASTM C 920, Type S, Grade NS, Class 50 recommended for exposed applications on interior and exterior locations involving joint movement of not more than plus or minus 50 percent. Subject to compliance with requirements, provide one of the following:
 - 1) BASF, MasterSeal NP 100
 - 2) Pecora, DyanTrol I-XL
 - 3) Tremco, Dymonic FC
- C. FIRESTOPPING
 - 1. Sealants and accessories shall have fire-resistance ratings indicated, as established by testing identical assemblies in accordance with UL 2079 or ASTM E 814, by Underwriters' Laboratories, Inc., or other NRTL acceptable to AHJ. Subject to compliance with requirements, provide one of the following:
 - a. Manufacturer[s]:
 - 1) 3M Corp., Fire Barrier Sealant
 - 2) Hilti, Inc.
 - 3) Tremco, Tremstop Fyre-Sil
 - 4) Pecora, AC-20 FTR
 - 5) RectorSeal
 - 6) Specified Technologies Inc. Firestop
 - 7) USG, SHEETROCK Firecode Compound
 - 8) Owens Corning Firestopping Insulation

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Coordinate seals with wall, ceiling, roof or floor materials and rating of the surface (sound, fire, waterproofing, etc.)
- C. Comply with NECA 1.
- D. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items, unless indicated otherwise.
- E. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

- F. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- G. Right of Way: Yield to raceways and piping systems installed at a required slope.

3.2 SLEEVES AND SLEEVE SEALS

- A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Provide sleeves for required openings in all concrete and masonry construction and fire, smoke, or both, partitions, for all electrical work that passes through such construction. Coordinate with all other trades and divisions to dimension and lay out all such openings.
- C. Only those openings specifically indicated on the Architectural or Structural Drawings will be provided under other divisions.
- D. Construction in Existing Facilities:
 - Saw cut or core drill existing walls, roofs and slabs to install sleeves and sleeve seals in existing facilities. Do not cut or drill any walls, roofs or slabs without first coordinating with, and receiving approval from, the Contract Administrator, Owner, or both. Seal sleeves into concrete walls or slabs with a waterproof non-shrink grout acceptable to the Contract Administrator. Provide roofing penetration seals and covers to match existing roofing materials. Coordinate roofing repair of adjacent roofing material with Owner's roofing contractor to provide a waterproof installation.
- E. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls. Do not cut or core drill new construction without written approval from the Contract Administrator and Structural Engineer.
- F. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- G. Rectangular Sleeve Minimum Metal Thickness:
 - 1. For sleeve cross-section rectangle perimeter less than 50 inches and no side greater than 16 inches, thickness shall be 0.052 inch.
 - 2. For sleeve cross-section rectangle perimeter equal to, or greater than, 50 inches and 1 or more sides equal to, or greater than, 16 inches, thickness shall be 0.138 inch.
- H. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- I. Install pipe and rectangular sleeves in above-grade walls and slabs, where penetrations are not subject to hydrostatic water pressures. Ensure that drip ring is fully encased and sealed within the wall or slab.
- J. Sleeve Length:
 - 1. Sleeves through walls: Cut sleeves to length for mounting flush with both surfaces of walls.
 - 2. Sleeves through floors: Extend sleeves 2 inches above finished floor level.
- K. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.
- L. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.
- M. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint
- N. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials.
- O. Aboveground, Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (or larger, if required by the seal manufacturer) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- P. Above Grade Concrete or Masonry Penetrations

- 1. Provide sleeves for cables or raceways passing through above grade concrete or masonry walls, concrete floor or roof slabs. Sleeves are not required for core drilled holes in existing masonry walls, concrete floors or roofs. Provide sleeves as follows:
 - a. Install schedule 40 galvanized steel pipe for sleeves smaller than 6 inches in diameter.
 - b. Install galvanized sheet metal for sleeves 6 inches in diameter and larger, thickness shall be 0.138 inches.
 - c. Install galvanized sheet metal for rectangular sleeves
 - d. Schedule 40 PVC pipe sleeves are acceptable for use in areas without return air plenums.
- Seal elevated floor, exterior wall and roof penetrations watertight and weather tight with nonshrink, non-hardening commercial sealant. Pack with mineral wool and seal both ends with minimum of ¹/₂" of sealant.
- Q. Underground, Exterior-Wall Penetrations: Install cast-iron wall pipes for sleeves. Size sleeves to allow for 1-inch (or larger, if required by the mechanical sleeve manufacturer) annular clear space between sleeve and cable or raceway. Provide mechanical sleeve seal.
 - 1. Use type and number of sealing elements recommended by manufacturer for pipe material and size. Position pipe in center of sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
 - 2. Inspect installed sleeve and sleeve-seal installation for damage and faulty work. Verify watertight integrity of sleeves and seals installed below grade to seal against hydrostatic pressure.
- R. Concrete Slab on Grade Penetrations:
 - 1. Provide ½" thick cellular foam insulation around perimeter of raceway passing through concrete foundation. Installation shall extend to 2" above and below the concrete slab.
- S. Elevated Floor Penetrations of waterproof membrane:
 - 1. Provide cast-iron wall pipes for sleeves. Size wall pipe for minimum ½" annular space between wall pipe and cable or raceway.
 - 2. Pack with mineral wool and seal both ends with minimum of ¹/₂" of waterproof sealant.
 - 3. Secure waterproof membrane flashing between clamping flange and clamping ring.
 - 4. Extend bottom of wall pipe below floor slab as required and secure underdeck clamp to hold wall pipe rigidly in place.
- T. Interior Foundation Penetration: Provide sleeves for horizontal raceway passing through or under foundation. Sleeves shall be cast iron soil pipe two normal pipe sizes larger than the pipe served.
- U. Interior Penetrations of Non-Fire-Rated Walls: Seal annular space between sleeve and cable or raceway, using joint sealant appropriate for size, depth, and location of joint. Pack with mineral wool and seal both ends with minimum of ½" of sealant.
- V. Exterior Wall Penetrations: Seal annular space between sleeve and raceway or duct, using joint sealant for size, depth, and location of joint. Pack with mineral wool and seal both ends with minimum of ½" of waterproof sealant.
- W. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boottype flashing units applied in coordination with roofing work.
- X. Sleeve-Seal Installation
 - 1. Install sleeve seals for all underground raceway penetrations through walls at elevations below finished grade. Additionally, install seals inside raceways, after conductors or cables have been installed, in all raceway penetrations through walls at elevations below finished grade.
 - Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

- Y. Inspect installed sleeve and sleeve-seal installations for damage and faulty work. Verify watertight integrity of sleeves and seals installed below grade and above grade where installed to seal against hydrostatic pressure.
- Z. Sleeves shall be protected throughout the course of construction, and when damaged shall be replace and/or repaired to a satisfactory condition.

3.3 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire/smoke-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

3.4 JOINT SEALERS

- A. Preparation for Joint Sealers
 - 1. Clean surfaces of penetrations, sleeves, or both, immediately before applying joint sealers, to comply with recommendations of joint sealer manufacturer.
 - 2. Apply joint sealer primer to substrates as recommended by joint sealer manufacturer. Protect adjacent areas from spillage and migration of primers, using masking tape. Remove tape immediately after tooling without disturbing joint seal.
- B. Application of Joint Sealers
 - 1. General: Comply with joint sealer manufacturers' printed application instructions applicable to products and applications indicated, except where more stringent requirements apply.
 - a. Comply with recommendations of ASTM C 962 for use of elastomeric joint sealants.
 - b. Comply with recommendations of ASTM C 790 for use of acrylic-emulsion joint sealants.
 - 2. Tooling: Immediately after sealant application and prior to time shining or curing begins, tool sealants to form smooth, uniform beads; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
- C. Installation of Fire-Stopping Sealant: Install sealant, including forming, packing, and other accessory materials, to fill openings around electrical raceways penetrating floors and walls, to provide fire-stops with fire-resistance ratings indicated for floor or wall assembly in which penetration occurs. Comply with installation requirements established by testing and inspecting agency.

SECTION 260502

EQUIPMENT WIRING SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This Section includes limited scope for electrical connections to equipment specified under other sections or divisions, or furnished under separate contracts or by the Owner.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Unless otherwise noted, perform all electrical work required for the proper installation and operation of equipment, furnishings, devices and systems specified in other divisions of these Specifications, furnished under other contracts, and/or furnished by the Owner for installation under this contract.
- B. Obtain and review shop drawings, product data, and manufacturer's instructions for equipment furnished under other sections.
- C. Determine connection locations and rough-in requirements based on shop drawings.
- D. Sequence rough-in of electrical connections to coordinate with installation schedule for equipment.
- E. Sequence electrical connections to coordinate with start-up schedule for equipment.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Division 01 and Division 26 Section "General Electrical Requirements".
- B. Product data for the following products for:
 - 1. Special connectors
 - 2. Special conductors or cable assemblies.
- C. Shop drawings for:
 - 1. Detailing electrical characteristics, wiring diagrams, fabrication and installation for wiring systems.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories:
 - 1. Listed and labeled as defined in NFPA 70, Article 100, by an NRTL as defined by OSHA in 29 CFR 1910.7, and that is acceptable to Authorities Having Jurisdiction.
 - 2. Marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS AND MATERIALS

- 2.1 CORDS AND CAPS
 - A. Attachment Plugs: Conform to NEMA WD 1.
 - B. Configuration: NEMA WD 6, matching receptacle configuration at outlet provided for equipment, or as required by the equipment manufacturer.

- C. Cord: See Paragraph "Flexible Cords" in Division 26 Section "Low-voltage Electrical Power Conductors and Cables".
- D. Provide cord size suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

PART 3 - EXECUTION

- 3.1 EXAMINATION
 - A. Verify conditions of equipment and installation prior to beginning work.
 - B. Verify that equipment is ready for connecting, wiring, and energizing.
- 3.2 INSTALLATION, GENERAL
 - A. Install in accordance with manufacturer's instructions.
- 3.3 ELECTRICAL DEVICES
 - A. Install disconnect switches, controllers, control stations, and control devices (other than temperature control devices) as indicated, specified in other divisions of these Specifications, furnished under other contracts, and/or furnished by the Owner for installation under this Contract.

3.4 ELECTRICAL CONNECTIONS

- A. Make electrical connections in accordance with equipment manufacturers' instructions.
- B. Make conduit connections to equipment using flexible conduit. Use liquid tight flexible conduit with watertight connectors in damp or wet locations.
- C. Make wiring connections using conductors and cable with insulation suitable for temperatures encountered in heat producing equipment.
- D. Provide receptacle outlet where connection with attachment plug is indicated. Provide cord and cap where field-supplied attachment plug is indicated on the Drawings.
- E. Provide suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- F. Provide interconnecting conduit and wiring between devices and equipment where indicated on the Drawings.

3.5 EQUIPMENT

- A. When equipment is delivered in separate parts and field assembled, internal wiring, indicated on Shop Drawings as field wiring, will be provided by the equipment supplier, unless otherwise noted.
- B. Provide power connection to all equipment as required and as indicated in the equipment supplier's installation drawings.
- C. Provide all control and interlock wiring for all equipment that is not included within the responsibility of Division 22 or 23.

SECTION 260519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

- 1.1 SECTION INCLUDES
 - A. Conductors, cables, and cords rated 600V and less.
 - B. Connectors and terminations rated 600V and less.
- 1.2 DEFINITIONS
 - A. The following abbreviations apply to this and other Sections of these specifications:
 - 1. MC: Metal Clad
 - 2. NBR: Acrylonitrile-butadiene rubber
 - 3. NETA ATS: Acceptance Testing Specification.
 - B. The following definitions apply to this and other Sections of these Specifications:
 - 1. HOMERUN: That portion of an electrical circuit beginning at a junction box, termination box, receptacle or switch with termination at an electrical panelboard.
 - a. Note: Where MC Cable is allowed to be utilized for receptacle and/or lighting branch circuiting loads, the originating point of the homerun shall be at the first load in the circuit or at a junction box in an accessible ceiling space immediately above the first (most upstream) load.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop and temperature deration.
 - 2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
 - 3. Coordinate electrical testing of electrical, mechanical, and architectural items, so equipment and systems that are functionally interdependent are tested to demonstrate successful interoperability.
- B. Notify Contract Administrator of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with Division 01 and Division 26 Section "General Electrical Requirements":
 - 1. Product data for the following products:
 - a. Conductors, cables, and cords rated 600V and less.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.
- C. Sustainable Design Documentation: Submit manufacturer's product data on conductor and cable showing compliance with specified lead content requirements.
- D. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors. Include proposed modifications to raceways, boxes, wiring gutters, enclosures, etc. to accommodate substituted conductors.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
- F. Qualification Data: For testing agency.
- G. Field quality-control test reports in accordance with NETA ATS:
 - 1. Submit all system and component test results.

- H. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.
- I. Operation and Maintenance Data: For cable and all accessories to include in operation and maintenance manuals.
- J. Follow-up service reports.

1.5 QUALITY ASSURANCE

- A. Materials shall be manufactured by companies that have been specializing in the products specified in this Section, for a minimum of 3 years.
- B. Provide products listed and classified by Underwriters Laboratories, Inc (UL) as suitable for the purpose specified and indicated.
- C. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
- D. Test Equipment Suitability and Calibration: Comply with NETA ATS, "Suitability of Test Equipment" and "Test Instrument Calibration."
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- F. Comply with NFPA 70.

1.6 PROJECT CONDITIONS

- A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Contract Administrator and obtain direction before proceeding with work.
- B. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner, or others, unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
 - 1. Notify Contract Administrator and the Owner no fewer than 7 days in advance of proposed interruption of electrical service.
 - 2. Do not proceed with interruption of electrical service without Contract Administrator and the Owner's written permission.
 - 3. Owner reserves the right to require Contractor to cease work in any area Owner requires access to on an emergency basis.
- C. Make every effort to schedule outages during non-business or off-peak business hours to minimize disruptions to business operations.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

PART 2 - PRODUCTS AND MATERIALS

2.1 CONDUCTORS AND CABLES - GENERAL

- A. Manufacturers, unless noted otherwise:
 - 1. AFC Cable Systems, Inc.
 - 2. Alan Wire
 - 3. Cerrowire
 - 4. Colonial Wire & Cable
 - 5. Encore Wire Corporation
 - 6. General Cable
 - 7. Northern Cables Inc.

- 8. Okonite Company
- 9. Southwire Company
- B. Conductor Material: Annealed (soft) copper complying with ICEA S-95-658/NEMA WC70 and UL Standards 44 or 83, as applicable.
 - 1. Solid conductors for No. 10 AWG and smaller; concentric, compressed stranded for No. 8 AWG and larger
 - 2. Stranded conductors
 - 3. Stranded for all flexible cords, cables, and control wiring.
 - 4. As noted otherwise below.
- C. Aluminum conductors are not allowed.
- D. Conductor Insulation: Type THHN/THWN-2 complying with ICEA S-95-658/NEMA WC70.
- E. Sizes of conductors and cables indicated or specified are American Wire Gage (Brown and Sharpe).
- F. Unless indicated otherwise, special purpose conductors and cables, such as low voltage control and shielded instrument wiring, shall be as recommended by the system equipment manufacturer.
- G. Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction, and ratings.

2.2 SINGLE CONDUCTORS

A. 600V, insulated conductors as noted above shall be color-coded as follows, unless noted otherwise:

PHASE	480Y/277V
A	Brown
В	Orange
С	Yellow
Neutral	Gray**
Equipment Ground	Green

**Except as provided in NFPA 70.

- B. Conductors shall not be smaller than No. 10 AWG, with the exception of wiring for signal and pilot control circuits; and pre-manufactured whips for light fixtures which may be No. 14 AWG.
- C. Conductors installed for site electrical work shall be no smaller than No. 10 AWG CU. All site electrical branch circuit wiring shall be sized such that the maximum branch circuit voltage drop is less than 3 percent.

2.3 FLEXIBLE CORDS

A. 600V, multi-conductor (2, 3, or 4 as indicated on the Drawings), oil-resistant black jacket, extrahard-usage; Type SEO, SO, or STO for indoor dry and damp locations; SEOW, SOW, or STOW for damp, wet, and outdoor locations; or as required by the manufacturer of the equipment to which the cords are connected.

2.4 CONTROL WIRING

A. Unless otherwise noted, all control wiring will be the responsibility of the Section or Division in which the control system is specified.

2.5 CONNECTORS

- A. Manufacturers:
 - 1. AMP; Tyco
 - 2. FCI-Burndy
 - 3. Gould
 - 4. Ideal Industries, Inc.
 - 5. Ilsco

- 6. NSi Industries, Inc.
- 7. O-Z/Gedney
- 8. Panduit
- 9. Thomas and Betts
- 10. 3-M Electrical Products Division
- B. Compression connectors for conductors No. 8 AWG and larger: Long-barreled, UL 486-listed, circumferential compression type (Burndy "Hylug", or equal), insulated with clamp-on, cold-shrink, or molded covers, or wrapped with multiple over-lapping layers of 3-M Scotch electrical tape.
 - 1. Termination fittings for copper conductors: Barecopper, 1- or 2-hole pad and inspection port.
- C. Mechanical connections for conductors No. 8 AWG and larger: UL-listed, dual-rated, mechanical type, insulated with clamp-on, cold-shrink, or molded covers, or wrapped with multiple overlapping layers of 3-M Scotch electrical tape.
 - 1. Termination fittings: Bare copper, 1- or 2-hole pad and inspection port.
- D. Connectors for solid conductors No. 10 AWG and smaller: Insulated winged wire nuts. Colorcoded for size, except use green only for grounding connections.
- E. Connectors for stranded conductors No. 10 AWG and smaller: Tinned copper, insulated-sleeve, compression type, UL-listed, with wire insulation grip. Terminations: ring-tongue type.
- F. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
- G. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.

PART 3 - EXECUTION

- 3.1 PREPERATION
 - A. Coordinate seals with wall, ceiling, roof or floor materials and rating of the surface (sound, fire, waterproofing, etc.)
 - B. Electrical conductor and cable work is schematically represented on the Drawings. Unless otherwise indicated, conductor sizes shown on the Drawings are based on not more than three single current-carrying conductors in a raceway in free air. Current ratings are based on copper at 75 degrees C temperature rating for all power circuits. Modify raceway and conductor sizing as may be necessitated by any deviation from these conditions. Do not decrease the indicated conductor size due to the use of conductors having a temperature rating of 90 degrees C.
 - C. Conductor sizes shown are minimum based on code requirements, voltage drop, and/or other considerations. Where approved by the Engineer and at no extra cost to the Owner, larger conductor sizes may be installed at Contractor's option in order to utilize stock sizes, provided raceway sizes are increased where necessary to conform with NFPA 70 (determine the effect of the use of larger conductors on the short circuit current ratings of the electrical equipment, and provide increased short circuit current rated equipment as required).
 - D. Where anticipated conductor installed lengths exceed the lengths indicated on the Drawings, notify Contract Administrator. Provide tabulated list of exceeded lengths for review. Increase conductor size, circuit ground size, and conduit size accordingly to meet maximum voltage drop indicated within the calculations.

3.2 INSTALLATION

- A. General
 - 1. Unless otherwise indicated on the Drawings on in other Sections, install all conductors in raceway. Install continuous conductors between outlets, devices and boxes without splices or taps. Do not pull connections into raceways. Leave at least 12 inches of conductor at outlets for fixture or device connections.
 - 2. Install in accordance with manufacturer's instructions.
 - 3. Use manufacturer-approved pulling compound or lubricant where necessary; compound used shall not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

- 4. Use pulling means, including fish tape, cable, rope, and basket weave conductor/cable grips that will not damage conductors/cables or raceway.
- 5. Seal around cables penetrating fire-rated elements according to Division 26, Common Work Results For Electrical.
 - a. Normal or Non-Essential circuits.
 - Maximum of 16 conductors in a single raceway. For up to eight conductors in a raceway, minimum raceway size: 3/4 inch. For greater than eight conductors, minimum raceway size: 1 inch. Do not install any other type of circuit in this raceway.
 - 2) The minimum wire size for all conductors in this raceway: No. 10 AWG.
 - 3) Only 15A and 20A branch circuit homeruns may be combined into one raceway.
- 6. For branch circuits fed from GFCI circuit breakers, limit the one-way conductor length to 100 feet between the panelboard and the most remote receptacle or load on the GFCI circuit.
- 7. Where the number of conductors for branch circuits is not shown on the Drawings, determine the number of conductors in accordance with NFPA 70. Provide adequate conductors so as to allow performance of all functions of the device.
- 8. Branch circuit conductors shall be copper.
- 9. All essential power systems circuits shall be copper.
- 10. Provide all conductors with 600V insulation of the following types, unless otherwise noted on the Drawings or in these Specifications:
 - a. Wet or dry locations, in raceways:
 - 1) Feeders and branch circuits: Type THWN, or THHN/THWN-2.
 - 2) Conductors No. 6 AWG and smaller: Types THWN or THHN/THWN-2.
- B. Flexible Cords
 - 1. Refer to Division 26 Section, "Equipment Wiring Systems", for electrical connections to equipment.
- C. Control Wiring
 - Unless otherwise indicated on the Drawings or in other sections, install all control wiring in raceway, regardless of voltage. A qualified Electrician shall install all control wire operating at 120V nominal and above. Control wiring operating at less than 120V (e.g., 12V and 24V) may be installed under the Division furnishing it.
 - 2. Open wiring in air-handling plenums: UL listed and classified for use in air plenums without raceway. Where indicated on the Drawings or otherwise specified, and permitted by local codes, only cable for communication or fire alarm systems and low voltage control wiring may be installed without raceways.
 - a. Low voltage wiring not routed in a race way shall be supported by cable tray or j-hooks secured independently of ceiling supports. Cabling shall not be supported directly by the ceiling system.
- D. Connections:
 - 1. Apply a zinc based, anti-oxidizing compound to connections.
 - 2. Tighten electrical connectors and terminals according to manufacturer's published torquetightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.
 - 3. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
 - 4. Use only resin pressure splices and splicing kits that totally encapsulate the splice for splices in underground junction boxes. Arrange the splicing kit to minimize the effects of moisture.
 - 5. Use connectors as indicated in equipment schedules. Where not indicated use connections as noted below.
 - a. Compression Conductors No. 8 AWG and larger to panelboards, switchboards and apparatus

- b. Compression splices, terminals
- c. Mechanical where temporary removal is required
- 6. Do not use terminals on wiring devices to feed through to the next device.
- 3.3 IDENTIFICATION
 - A. General: Provide all identification per Division 26 "Identification for Electrical Systems".
 - B. Single Conductors: Identify and color-code conductors to indicate voltage and phase according to Part 2 of this Section. Identification method shall be either:
 - 1. Factory provided colored insulation
 - 2. Color-Coding Conductor Tape.
 - 3. 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.
 - C. Power-Circuit Conductor Identification: For primary and secondary conductors 1/0 AWG and larger in vaults, pull and junction boxes, manholes, and handholes identify voltage, source and circuit number of each set of conductors. For single conductor cables, identify phase in addition to the above.
 - D. Branch-Circuit Conductor Identification: Where there are conductors for more than three branch circuits in the same junction or pull box identify each ungrounded conductor according to voltage, source and circuit number.
 - E. Conductors to Be Extended in the Future: Attach identification device to conductors and list source and circuit number.
 - F. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, signal, sound, intercommunications, voice, and data connections.
 - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 - 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 - 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and Operation and Maintenance Manual.
 - G. Conductors for controls (lighting, controls): Label each conductor with Markers for Conductor and Control Cables. identify conductors using method as noted in Division 26 Section "Identification for Electrical Systems". Note conductor identification on record Drawings.
 - H. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
 - I. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
 - J. Low voltage cable sheath labels and related manufacturer information shall remain apparent in all exposed applications.
 - 1. Protect exposed cabling labels from painting and overspray (this includes protection of cables in cable tray)

3.4 FIELD QUALITY CONTROL

- A. Testing: 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. Test all wiring prior to energizing to ensure that it is free from unintentional grounds and shorts, is properly phased, and that all connectors are tight.
 - 2. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3. 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.

SECTION 260533

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL REQUREMENTS

1.1 SECTION INCLUDES

- A. This Section includes:
 - 1. Raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.2 DEFINITIONS

- A. Terminology used in this specification is as defined below:
 - 1. EMT: Electrical Metallic Tubing
 - 2. FMC: Flexible Metal Conduit
 - 3. GRS: Galvanized Rigid Steel Conduit
 - 4. IMC: Intermediate Metal Conduit
 - 5. LFMC: Liquidtight Flexible Metal Conduit
 - 6. LFNC: Liquidtight Flexible Nonmetallic Conduit
 - 7. RAC: Rigid Aluminum Conduit
 - 8. RMC: Rigid Metal Conduit
 - 9. RNC: Rigid Nonmetallic Conduit

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of raceway, boxes, or other potential obstructions within the dedicated equipment spaces and working clearances for equipment installed by other trades in accordance with the codes and manufacturer requirements.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
 - 4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
 - 5. Coordinate the work with other trades to provide walls suitable for installation of flushmounted boxes where indicated. Coordinate the work with other trades to preserve insulation integrity.

6.

1.4 QUALITY ASSURANCE

- A. Materials shall be manufactured by companies that have been specializing in the products specified in this Section, for a minimum of 3 years.
- B. Electrical Components, Devices, and Accessories:
 - 1. Listed and labeled as defined in NFPA 70, Article 100, by an NRTL as defined by OSHA in 29 CFR 1910.7, and that is acceptable to AHJ.
 - 2. Marked for intended use.
- C. Comply with NFPA 70.

PART 2 - PRODUCTS AND MATERIALS

- 2.1 CONDUITS, SURFACE MOUNTED RACEWAYS AND ACCESSORIES
 - A. Metal Conduit

- 1. Manufacturers:
 - a. ABB, Inc.
 - b. AFC Cable Systems, Inc.; a division of Atkore International
 - c. Allied Tube and Conduit
 - d. American Conduit
 - e. Anamet Electrical, Inc.
 - f. Electri-Flex Co.
 - g. Nucor Tubular Products.
 - h. O-Z/Gedney Co.; Emerson.
 - i. Republic Raceway.
 - j. Southwire Company, LLC
 - k. Western Tube and Conduit Corporation.
 - I. Wheatland Tube Co.
- 2. RMC:
 - a. GRS: Hot-dip galvanized: ANSI C80.1, UL 6.
 - 1) Plastic-Coated GRS and Fittings: NEMA RN 1, UL-listed. Coating thickness of 0.04 inches (1mm), minimum.
 - b. RAC: ANSI C80.5, UL6A.
- 3. IMC: ANSI C80.6, UL 1242.
 - a. Plastic-Coated IMC and Fittings: NEMA RN 1, UL-listed.
- 4. EMT and Fittings: ANSI C80.3, UL 797. Only steel products allowed. Reduced wall EMT is not allowed.
 - a. Fittings: Set-screw or Compression type.
- 5. FMC: Aluminum or Zinc-coated steel: UL 1. Reduced wall FMC is not allowed.
- 6. LFMC: Flexible steel raceway with PVC jacket: UL 360.
 - a. Fittings: NEMA FB 1; compatible with raceway and tubing materials.
- B. Nonmetallic Raceway
 - 1. Manufacturers:
 - a. ABB, Inc.
 - b. AFC Cable Systems, Inc. (Tubing); a division of Atkore International
 - c. Allied Tube and Conduit
 - d. American Pipe and Plastics, Inc.
 - e. Anamet Electrical, Inc.
 - f. Arnco Corp.
 - g. Atkore
 - h. Cantex Inc.
 - i. Champion Fiberglass, Inc.
 - j. Electri-Flex Co.
 - k. FRE Composites.
 - I. Hubbell Inc. (Fittings)
 - m. IPEX USA, LLC.
 - n. Phoenix Contact.
 - o. Prime Conduit.
 - p. Southwire Corporation.
 - q. Superflex Ltd.
 - r. United Fiberglass of America, Inc.

- 2. RNC: Schedule 40 PVC: NEMA TC 2, UL 651.
 - a. Fittings: match to raceway and tubing type and material: NEMA TC 3, NEMA TC 6, UL 651, as applicable.
- 3. ENT: NEMA TC 13, UL-listed.
 - a. Fittings: match to tubing type and material: NEMA TC 13, NEMA TC 6, UL 651, as applicable.
- 4. LFNC: UL 1660.
 - a. Fittings: match to tubing type and material: NEMA TC 3, NEMA TC 6, UL 651, as applicable.
- 5. RTRC: UL 2420, UL 2515, NEMA TC 14
- 6. Phenolic Conduit
- C. Metal Wireways
 - 1. Manufacturers:
 - a. BEL Products, Inc.
 - b. Cooper B-Line; Eaton.
 - c. EPI-Electrical Enclosures
 - d. Hoffman.
 - e. Square D.
 - 2. Material and Construction: 14 gauge (minimum) sheet steel, sized and shaped as indicated, NEMA 1, or 3R.
 - 3. Fittings and Accessories: Include couplings, offsets, elbows, expansion/deflection joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system. Select features, unless otherwise indicated, as required to complete wiring system and to comply with NFPA 70. Where indicated, provide a barrier to divide wireway into compartments.
- D. Nonmetallic Wireways
 - 1. Manufacturers:
 - a. ABB, Inc.
 - b. Enduro Composite Systems
 - c. Hoffman.
 - 2. Description: Fiberglass reinforced polyester, extruded and fabricated to size and shape indicated, with no holes or knockouts. Gasketed cover with oil-resistant gasket material.
 - a. Stainless steel captive screws
 - 3. Description: PVC, extruded and fabricated to size and shape indicated, with snap-on cover and mechanically coupled connections with plastic fasteners.
 - 4. Fittings and Accessories: Include couplings, offsets, elbows, expansion/deflection joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
 - 5. Select features, unless otherwise indicated, as required to complete wiring system and to comply with NFPA 70.

2.2 BOXES, ENCLOSURES AND CABINETS

- A. General
 - 1. Manufacturers:
 - a. ABB, Inc.
 - b. American Midwest Power
 - c. Appleton/O-Z Gedney Co.; Emerson.
 - d. BEL Products, Inc.
 - e. Cooper Crouse-Hinds; Eaton.
 - f. Erickson Electrical Equipment Co.

- g. FSR, Inc.
- h. Hoffman.
- i. Hubbell, Inc.
- j. Legrand.
- k. Molex; Koch Industries.
- I. Robroy Industries, Inc.; Enclosure Division.
- m. Spring City Electrical Manufacturing Co.
- 2. Provide products listed, classified, and labeled as suitable for the purpose intended. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
- 3. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
- 4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- 5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
 - 1. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
 - 2. Cast Metal Boxes: Comply with NEMA FB 1, Type FD, with gasketed cover. Furnish with threaded hubs.
 - a. List and label as complying with UL 514A for non-hazardous locations;.
 - b. List and label as complying with UL 886 for hazardous locations, where required.
 - 3. Nonmetallic Boxes: Comply with NEMA OS 2, and list and label as complying with UL 514C.
 - 4. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
 - 5. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes.
 - 6. Minimum Box Size, Unless Otherwise Indicated:
 - a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 1-1/2 inch deep (100 by 38 mm) trade size.
 - b. Communications Systems Outlets: Comply with Section 27 10 05.
 - c. Communications Systems Outlets: 4 inch square by 2-1/8 inch (100 by 54 mm) trade size.
 - d. Ceiling Outlets: 4 inch octagonal or square by 1-1/2 inch deep (100 by 38 mm) trade size.
 - 7. Do not use "through-wall" boxes designed for access from both sides of wall.
 - 8. Wall Plates: Comply with Division 26 Section "Wiring Devices".
- C. Junction and Pull Boxes Larger Than 100 cubic inches:
 - 1. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1, and list and label as complying with UL 514A.
 - 2. Cast-Metal Pull and Junction Boxes: NEMA FB 1, cast iron or aluminum with gasketed cover.
 - 3. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
 - 4. Boxes 6 square feet and Larger: Provide sectionalized screw-cover or hinged-cover enclosures.
- D. Cabinets and Enclosures:
 - 1. General:

- a. Compliance: NEMA 250, and list and label as complying with UL 50 and UL50E or 508A, as applicable.
- b. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes: Shall be keyed. Provide 2 keys for each enclosure.
 - 1) All locks shall be keyed alike.
- c. NEMA 250 Environment ratings:
 - 1) NEMA Type 1: Code-gauge phosphatized steel with continuously welded seams; non-gasketed removable hinged front cover, with flush latch and concealed hinge; collar studs.
 - 2) NEMA Type 3R: Code-gauge galvanized steel with drip shield top, seam-free front, side, and back; non-gasketed continuous-hinged door, with stainless steel pin; captive, plated steel cover screws; hasp and staple for padlocking; collar studs.
- d. Provide enclosures wider than 36 inches with double doors; removable center posts; internal bracing, supports, or both, as required to maintain their structural integrity; and, accessory feet where required for freestanding equipment.
- e. Provide clamps, grids, slotted wireways, or similar devices to which or by which wiring may be secured. Provide DIN-rail mounted terminal strips for terminating all incoming and outgoing control wiring, and power terminal blocks for incoming/outgoing power wiring. Provide wire management troughs where practicable.
- f. Provide metal barriers to separate compartments containing control wiring operating at less than 50 volts from power and higher-voltage control wiring.

2.3 FACTORY FINISHES

- A. Interior Finish: All interior components shall be factory finished; manufacturer's standard grey unless otherwise noted.
- B. Exterior Finish: For metal wireway and surface raceway, enclosure, or cabinet components, provide ANSI 61 grey applied to factory-assembled metal wireway and surface raceways, enclosures, and cabinets before shipping.

PART 3 - EXECUTION

- 3.1 INSTALLATION
 - A. General
 - 1. Install in accordance with manufacturer's instructions

3.2 RACEWAYS

- A. General
 - 1. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on drawings or in this article are stricter.
 - Provide sizes and types of raceways as indicated on the Drawings. Sizes are based on THWN insulated copper conductors, except where noted otherwise. Where sizes are not shown on the Drawings or in the Specifications, size raceways in accordance with NFPA 70 requirements for the number, size and type of conductors installed. Minimum raceway size: 1/2 inch (concealed and exposed); 1 inch (underground and under slab).
 - a. 1/2 inch conduit shall contain maximum (5) #12AWG conductors or (3) #10AWG conductors.

b.

- 3. Provide all raceways, fittings, supports, and miscellaneous hardware required for a complete electrical system as described by the Drawings and Specifications.
- 4. Install a green-insulated, equipment-grounding conductor, which is bonded to the electrical system ground, in all raceways.
- 5. Install grounding bushings on all conduit terminations and bond to the enclosure, equipment grounding conductor, and electrical system ground.

- 6. Install raceways concealed in walls or above suspended ceilings in finished areas. When approved by the Contract Administrator, raceways may be installed concealed in elevated floor slabs. Do not install raceways horizontally within slabs on grade.
- 7. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portions of bends are not visible above the finished slab.
- 8. 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.
- 9. Make bends and offsets so inside diameters are not reduced. Keep legs of bends in the same plane and keep straight legs of offsets parallel, unless otherwise indicated.
- 10. Install raceways:
 - a. To meet the requirements of the structure and the requirements of all other Work on the Project.
 - b. To clear all openings, depressions, ducts, pipes, reinforcing steel, and so on.
 - c. Within or passing through the concrete structure in such a manner so as not to adversely affect the integrity of the structure. Become familiar with the Architectural and the Structural Drawings and their requirements affecting the raceway installation. If necessary, consult with the Contract Administrator.
 - d. Parallel or perpendicular to building lines or column lines.
 - e. Tight to structure.
 - f. When concealed, with a minimum of bends in the shortest practical distance, considering type of building construction and obstructions, unless otherwise indicated.
- 11. Where masonry walls are left unfinished, coordinate raceway installations with other trades so that the raceways and boxes are concealed and the wall will have a neat and smooth appearance.
- 12. Support raceways from structural elements of the building as required by NFPA 70, Division 26 Section "Hangers and Supports for Electrical Systems". Do not support raceways by hangers used for any other systems foreign to the electrical systems; and, do not attach to other foreign systems. Do not lay raceways on top of the ceiling system.
 - a. Raceways on roof shall be supported from structure not from the roof deck.
- 13. Provide support spacing in accordance with NFPA 70 requirements, and at a minimum in accordance with NEMA standards. Support by the following methods:
 - a. Attach single raceway directly to structural steel with beam clamps.
 - b. Attach single raceway directly to concrete with one-hole clamps or clips and anchors. Outdoors and wherever subject to dampness or moisture, offset raceways from the surface by using galvanized clamps and clamp backs, to mitigate moisture entrapment between raceways and surfaces.
 - c. Attach groups of raceway to structural steel with slotted support system attached with beam clamps. Attach raceway to slotted channel with approved raceway clamps.
 - d. Attach groups of raceway to concrete with cast-in-place steel slotted channel fabricated specifically for concrete embedment. Attach raceway to steel slotted channel with approved raceway clamps.
 - e. Hang plumb horizontally suspended single raceway using a threaded rod. Attach threaded rods to concrete with anchors and to structural steel with beam clamps. Attach raceway to threaded rod with approved raceway clamps.
 - f. Hang horizontally suspended groups of raceway using steel slotted support system suspended from threaded rods. Attach threaded rods to concrete with anchors and to structural steel with beam clamps. Attach raceway to steel slotted channel with approved raceway clamps.
 - g. Support conductors in vertical raceway in accordance with NFPA 70 requirements.
 - h. Cross-brace suspended raceway to prevent lateral movement during seismic activity.
 - i. Use pre-fabricated non-metallic spacers for parallel runs of underground or under-slab conduits, either direct buried or encased in concrete.

- 14. Install electrically- and physically-continuous raceways between connections to outlets, boxes, panelboards, cabinets, and other electrical equipment with a minimum possible number of bends and not more than the equivalent of four 90-degree bends between boxes. Make bends smooth and even, without flattening raceway or flaking the finish.
- 15. Protect all electrical Work against damage during construction. Repair all Work damaged or moved out of line after rough-in, to meet the Contract Administrator's approval, without additional cost to the Owner. Cover or temporarily plug openings in boxes or raceways to keep raceways clean during construction. Clean all raceways prior to pulling conductors or cables.
- 16. Align and install raceway terminations true and plumb.
- 17. Complete raceway installation before starting conductor installation.
- 18. Install a pull cord in each empty raceway that is left empty for installation of wires or cables by other trades or under separate contracts. 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 cord.
- 19. Route raceway through roof openings for piping and ductwork or through roof seals approved by the Contract Administrator, the roofing contractor, or both. Obtain approval for all roof penetrations and seal types from the Contract Administrator, Owner, roofing contractor, or all three as required to maintain new or existing roofing warranties.
- 20. 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. Install raceway sealing fittings at the following points:
 - a. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces or from building exterior to building interior.
 - b. Where otherwise required by NFPA 70.
- 21. 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 as required by other requirements of the construction documents.; FMC may be used 6 inches above the floor. Install screwdriver-operated, threaded plugs flush with floor for future equipment connections.
- 22. Maintain 2" minimum spacing from bottom of roof deck to prevent raceway penetrations from above
- 23. Do not route conduits across skylights, access panels, hatched tiles, HVAC diffusers, or equipment working space.
- 24. Route conduits serving rooftop equipment concealed inside the equipment curb and minimize roof penetrations and exterior conduit runs where practicable.
- 25. Install all underground conduits/raceways a minimum of 24" below the bottom of slab/paving/grade, unless noted otherwise, where practicable.
- 26. Provide boxes and raceways for the fire protection system low voltage wiring as required. This includes low voltage wiring exposed less than 96" AFF.
 - a. At a minimum, provide 3/4" conduit.
 - b. Coordinate requirements and locations with system installer and fire alarm specifications.

B. RMC

- 1. Use GRS or IMC in the following areas:
 - a. Where indicated.
 - b. Exterior applications where above grade and exposed.
 - c. Below grade when concrete-encased, plastic-coated, or provided with a corrosion resistant approved mastic coating.

- d. All raceways penetrating slabs on grade (use plastic-coated raceway or provide with a corrosion resistant approved mastic coating). This shall include the 90-degree elbow below grade and the entire vertical transition to above grade.
- е. .
- f. Damp or wet locations.
- 2. Use RAC in the following areas:
 - a. Indoors above grade.
 - b. Interior wet or damp locations.
 - c. For circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.
- 3. Do not use RAC:
 - a. Below grade.
 - b. Imbedded in concrete or other areas corrosive to RAC.
- C. EMT
 - 1. Use EMT in the following areas:
 - a. Where indicated.
 - b. Interior concealed locations for:
 - 1) Branch circuits.
 - 2) Feeders.
 - 3) Emergency branch circuits.
 - 4) Low-voltage control, security, and fire alarm circuits
 - c. Exposed where not subject to physical damage
 - 1) Mechanical rooms
 - 2. Do not use EMT:
 - a. Below grade.
 - b. In exterior applications when exposed.
- D. FMC and LFMC
 - 1. Use FMC or LFMC:
 - a. For the final 24 inches of raceway to all motors, transformers, and other equipment subject to vibration or movement.
 - b. From outlet boxes (attached to building structure) to recessed light fixtures. Install sufficient length to allow for relocating each light fixture within a 5-foot radius of its installed location.
 - c. Use FMC only in dry locations
 - d. Use LFMC in damp, wet, corrosive, outdoor locations.
 - 2. Do not use FMC or LFMC:
 - a. For branch circuits, homeruns or feeders.
 - b. In lengths exceeding 6 feet.
- E. RNC
 - 1. Solvent-weld RNC fittings and raceway couplings per the manufacturer's instructions and make all connections watertight. Use solvent of the same manufacturer as the raceway.
 - 2. Where installed exposed outdoors or other areas subject to temperature variations, install expansion fittings per NFPA 70, to accommodate thermal expansion in straight runs.
 - 3. RNC is only allowed to be used in the following locations:
 - a. Where specifically indicated.
 - 1) If an adopted code prevents use of RNC in a location where the contract documents specifically allows its use, contractor shall utilize other types of conduit allowed by the specification.

- 2) Allowed does not mean required.
- b. Underground, single and grouped, in lieu of GRS or IMC, when indicated.
 - 1) Direct buried
 - Concrete-encased (use approved rigid PVC interlocking spacers, selected to provide minimum duct spacing and cover depths indicated while supporting ducts during concreting and backfilling; produced by the same manufacturer as the ducts).

3.3 RACEWAY FITTINGS:

- A. Compatible with raceways and suitable for use and location.
- B. RMC and IMC: Use threaded rigid steel conduit fittings, unless otherwise indicated.
- C. PVC Externally Coated, Rigid Steel Conduits: Use only fittings and installation tools approved by the manufacturer for use with that material. Patch all nicks and scrapes in PVC coating after installing conduits. Replace all fittings and conduits that have any portion of the coating scraped off to bare metal, at no additional cost to the Owner.
- D. Join raceways with fittings designed and approved for that purpose and make joints tight.
- E. Use insulating bushings to protect conductors at raceway 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.

3.4 WIREWAYS:

- A. Use flat head screws, clips and straps to fasten wireways to surfaces. Mount plumb and level.
- B. Use suitable insulating bushings and inserts at connections to outlets and corner fittings.
- C. Close ends of wireway and unused raceway openings.
- 3.5 BOXES:
 - A. General
 - 1. Verify locations of device boxes prior to rough in.
 - 2. Set boxes at elevations to accommodate mounting heights as specified or indicated on the Drawings.
 - 3. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Adjust box locations to accommodate intended purpose.
 - 4. Install boxes to preserve fire ratings of walls, floors, and ceilings.
 - 5. Install flush wall-mounted boxes without damaging wall insulation or reducing its effectiveness.
 - 6. Support boxes independently of raceway.
 - 7. Clean the interior of boxes to remove dust, debris, and other material. Clean exposed surfaces and restore finish.
 - 8. Adjust flush-mounted boxes to make front edges flush with finished wall material.
 - 9. Provide boxes of the depth required for the service, device and the application, and with raised covers set flush with the finished wall surface for boxes concealed in plaster finishes. Select covers with the proper openings for the devices being installed in the boxes. Install boxes flush unless otherwise indicated.
 - 10. Install outlet boxes in firewalls complying with UL requirements, with box surface area not exceeding 16 square inches; and, when installed on opposite sides of the wall, separate by a distance of at least 24 inches.
 - B. NEMA Enclosure ratings: Suitable for the environment in which it is installed. At a minimum, provide the following ratings:
 - 1. NEMA 250, type 3R

- a. Provide at exterior locations
- 2. NEMA 250, type 1
 - a. Provide at interior and dry locations
- 3. NEMA 250 type 4 stainless steel
 - a. Provide at interior damp or wet locations
 - b. Provide at interior locations where associated device is labeled as Weather Proof and/or Weather Resistant, unless requirement below already requires box to be rated otherwise.
- 4. NEMA 250 type 4X
 - a. Provide at interior locations subject to corrosion
- C. Junction and Pull Boxes
 - 1. Install junction and pull boxes above accessible ceilings and in unfinished areas.
 - 2. Provide boxes set flush in painted walls or ceilings with primer coated cover.
 - 3. Where junction and pull boxes are installed above an inaccessible ceiling, locate so as to be easily accessible from a ceiling access panel.
 - 4. Boxes for exterior use shall be:
 - a. PVC with a UV-stabilized PVC cover sealed and gasketed watertight.
 - b. Cast aluminum with a cast aluminum cover sealed and gasketed watertight.
 - c. Cast iron with cast iron cover sealed and gasketed watertight in vehicular traffic areas. Provide box and cover UL listed for use in vehicular traffic areas.
 - d. Install buried boxes so that box covers are flush with grade, unless indicated otherwise.
- 3.6 CABINETS AND ENCLOSURES:
 - A. Unless otherwise indicated on the Drawings, provide
 - 1. NEMA 1 construction for indoor, dry locations
 - 2. NEMA 12 for indoor, damp and dusty locations
 - 3. NEMA 3R for outdoor locations
 - 4. NEMA 4X for indoor wet and corrosive locations
 - B. Install flush mounted in the wall in finished spaces, with the top 78 inches above finished floor. The front shall be approximately 3/4-inch larger than the box all around.
 - C. Install surface mounted in unfinished spaces, with the top 78 inches above finished floor. The front shall be the same height and width as the box.
 - D. Electrically ground all metallic cabinets and enclosures. Where wiring to cabinet or enclosure includes a grounding conductor, provide a grounding lug in the interior of the cabinet or enclosure. Cabinets and enclosures specified in this Section are intended to house miscellaneous electrical components assembled in a custom arrangement, such as contactors and relays.
 - E. All components that are specified or indicated for assembly in cabinets and enclosures shall each be individually UL listed and labeled. Arrange wiring so that it can be readily identified. Support wiring no less than every 3 inches. Install gauges, meters, pilot lights and controls on the face of the door.
 - F. Do not provide cabinets and enclosures smaller than the sizes indicated. Where sizes and types are not indicated, provide cabinets and enclosures of the size, type and classes appropriate for the use and location per the guidelines of the NEC. Provide all items complete with covers and accessories required for the intended use.

3.7 IDENTIFICATION

A. Refer to Division 26 Section "Identification for Electrical Systems" for identification materials.

SECTION 260553

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. This Section includes the following:
 - 1. Nameplates.
 - 2. Labels for raceways.
 - 3. Labels for junction boxes and pull boxes.
 - 4. Markers for conductors, and control cables.
 - 5. Tags.
 - 6. Underground-line warning tape.
 - 7. Warning labels and signs.
 - 8. Arc Flash Warning Labels.
 - 9. Instruction signs.
 - 10. Miscellaneous identification products.
 - 11. Painted Identification.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Where a facility identification standard already exists, that standard shall be continued. Where an identification standard does not exist, color-coding and identification shall be as described herein.
- B. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual, and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- C. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.
- D. Coordinate installation of identifying devices with location of access panels and doors.
- E. Install identifying devices before installing acoustical ceilings and similar concealment.

1.3 QUALITY ASSURANCE

- A. Electrical Equipment, Components, Devices, and Accessories:
 - 1. Listed and labeled as defined in NFPA 70, by an NRTL as defined by OSHA in 29 CFR 1910.7 and that are acceptable to authorities having jurisdiction.
 - 2. Marked for intended use.
- B. Comply with ANSI A13.1 and ANSI C2.
- C. Comply with requirements of NFPA 70.
- D. Comply with 29 CFR 1910.145.

PART 2 - PRODUCTS AND MATERIALS

- 2.1 GENERAL
 - A. Location, text, and method of identification to be used is noted in individual sections. Refer to other sections for additional identification requirements.

2.2 NAMEPLATES

- A. Comply with UL RP 9691, Recommended Practice for Nameplates for Use in Electrical Installations.
- B. Engraved, Laminated Acrylic or Melamine Label: Non-conductive phenolic with beveled edges.
 - 1. Adhesive backed.
 - 2. Minimum 1/16 inch (1.6 mm) thick for nameplates with both dimension 4 inches (102 mm) or less and 1/8 inch (3.2 mm) thick for larger sizes.
- C. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
- D. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text
- E. Text: Minimum text height shall be 1/8 inch (3.2 mm) unless otherwise required by local jurisdiction or owner standards. For elevated components, increase sizes of labels and letters to those appropriate for viewing from the floor.
- F. Colors:
 - 1. Normal systems white letters on a black background.
- G. Label Requirements:
 - 1. Disconnect Switch Label:

LINE 1: DESIGNATION OF EQUIPMENT SERVED BY DISCONNECT LINE 2: VOLTAGE, PHASE, WIRES, AMPS LINE 3: FED FROM ""

EXAMPLES:

WATER HEATER WH1 480V, 3PH, 3W, 100A FED FROM MDB

- 2.3 LABELS FOR RACEWAYS AND METAL-CLAD CABLE
 - A. Factory Painted Raceways:
 - 1. Metal Raceways: Continuous, rust-inhibiting paint factory applied.
 - 2. Non-Metallic Raceways: Factory dyed or colored PVC sleeve.
 - B. Factory Painted Metal-Clad Cable: 2-inch wide, factory painted bands at a maximum of 6-foot on center spacing.
 - C. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
 - D. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
 - E. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
 - F. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches (50 mm) wide; compounded for outdoor use.
- 2.4 LABELS FOR JUNCTION BOXES AND PULL BOXES
 - A. Junction box and pull box covers shall be spray painted to identify the voltage and system. Circuit numbers and the panel they originate from shall be listed on the cover using permanent, waterproof, black ink marker.

2.5 MARKERS FOR CONDUCTOR AND CONTROL CABLES

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.
- B. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- C. Self-laminating Computer Printable Labels: Clear over-laminate to protect legend for permanent, clean identification. Self-laminating Polyester material with white print-on area.
- D. Aluminum Wraparound Marker Labels: Cut from 0.014-inch- (0.35-mm-) thick aluminum sheet, with stamped, embossed, or scribed legend, and fitted with tabs and matching slots for permanently securing around wire or cable jacket or around groups of conductors.
- E. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch (50 by 50 by 1.3 mm), with stamped legend, punched for use with self-locking nylon tie fastener.
- 2.6 TAGS
 - A. Write-On Tags: Polyester tag, 0.010 inch (0.25 mm) thick, with corrosion-resistant grommet and polyester or nylon tie for attachment to conductor or cable.
 - 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
- 2.7 UNDERGROUND-LINE WARNING TAPE
 - A. Materials: Use foil-backed detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
 - B. Foil-backed Detectable Type Tape: 6 inches (152 mm) wide, with minimum thickness of 5 mil, unless otherwise required for proper detection.
 - C. Legend: Type of service, continuously repeated over full length of tape.
 - D. Color: Tape for Buried Power Lines: Black text on red background.

2.8 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145. Attachment method shall be acceptable to the manufacturers of the equipment to which the nameplates are being applied and shall not compromise any NRTL listing or labeling criteria.
- B. Self-Adhesive Warning Labels: Factory pre-printed or machine-printed multicolor self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969, configured for display on front cover, door, or other access to equipment, unless otherwise indicated.
 - 1. Use thermal transfer process printing machines and accessories recommended by label manufacturer.
 - 2. Do not use labels designed to be completed using handwritten text.
- C. Baked-Enamel Warning Signs: Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
 - 1. 1/4-inch (6.4-mm) grommets in corners for mounting. Nominal size, 7 by 10 inches (180 by 250 mm).
- D. Metal-Backed, Butyrate Warning Signs: Weather-resistant, nonfading, preprinted, celluloseacetate butyrate signs with 0.0396-inch (1-mm) galvanized-steel backing; and with colors, legend, and size required for application.
 - 1. 1/4-inch (6.4-mm) grommets in corners for mounting. Nominal size, 10 by 14 inches (250 by 360 mm).
- E. Warning label and sign shall include, but are not limited to, the following legends:
 - 1. Multiple Power Source Warning: "DANGER ELECTRICAL SHOCK HAZARD EQUIPMENT HAS MULTIPLE POWER SOURCES."

- Workspace Clearance Warning (208 Volts): "WARNING OSHA REGULATION AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."
- Workspace Clearance Warning (480 Volts): "WARNING OSHA REGULATION AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 48 INCHES (915 MM)."
- 2.9 MISCELLANEOUS IDENTIFICATION PRODUCTS
 - A. Cable Ties: Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength: 50 lb (22.6 kg), minimum.
 - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 - 4. Color: Black, except where used for color-coding.
 - B. Fasteners for Nameplates, Labels and Signs
 - 1. Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat lock washers unless otherwise noted.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify identity of each item before installing identification products.
- B. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.
- C. Provide identification product listed for the location in which it is to be installed.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Painted Identification: Prepare surface and apply paint according to Division 09 painting sections.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. For surfaces that require finish work, apply identification devices after completing finish work. Do not install identification products until final surface finishes and painting are complete.
- C. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed. Replace labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.
- D. Location: Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance without interference with operation and maintenance of equipment. Unless otherwise indicated, locate products as follows:
 - 1. Surface-Mounted Equipment: Enclosure front.
 - 2. Flush-Mounted Equipment: Inside of equipment door.
 - 3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.

4.

- 5. Branch Devices: Adjacent to device.
- 6.
- 7. Conduits: Legible from the floor.
- 8. Boxes: Outside face of cover.
- 9. Conductors and Cables: Legible from the point of access.
- 10. Devices: Outside face of cover.

- E. Attach non-adhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.
 - 1. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.
- F. Equipment Nameplates and Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and Operation and Maintenance Manual.
 - 1. Indoor Clean, Dry Locations: Use plastic nameplates, unless noted otherwise.
 - 2. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
- G. Install identification products centered, level, and parallel with lines of item being identified.
- H. Mark all handwritten text, where permitted, to be neat and legible.



	MODEL #		GPM	HEAD	DISCHARGE	ELECTRICAL		4L	NOTES
WINDING FORCER	MODEL #	Ecolution		(FT.)	SIZE (IN.)	VOLTS	PH	HP	Noteo
WEIL	2516-513	OUTSIDE AREA G	100	20	2	460	3	5	A-I

- 1. PRIOR TO SUBMITTING BID, VISIT THE JOB SITE AND BECOME FULLY ACQUAINTED WITH THE EXISTING CONDITIONS OF THE PROJECT. REVIEW THE GENERAL NOTES, SPECIFICATIONS AND OTHER DRAWINGS FOR ADDITIONAL REQUIREMENTS WHICH MAY NOT BE SPECIFICALLY CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS. NOTIFY ARCHITECT, ENGINEER AND/OR OWNER OF CONFLICTS OR DISCREPANCIES PRIOR TO SUBMISSION OF BID.
- 2. EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS AND SITE VISITS AND MAY NOT REFLECT EXACT "AS-BUILT" CONDITIONS. FIELD VERIFY EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BIDS. COORDINATE NEW WORK AND DEMOLITION WITH OTHER DISCIPLINES
- 3. OWNER RETAINS RIGHTS OF SALVAGE FOR EQUIPMENT AND FIXTURES TO BE REMOVED. COORDINATE WITH THE OWNER THE EQUIPMENT AND FIXTURES TO BE SALVAGED AND THE LOCATION FOR STORAGE. AVOID DAMAGE TO EQUIPMENT, FIXTURES AND DEVICES DURING
- 5. AVOID DAMAGING EXISTING SURFACES AND EQUIPMENT TO REMAIN FOR NEW INSTALLATION. REPAIR ANY DAMAGE CAUSED DURING WORK
- 6. SEAL ALL PENETRATIONS THROUGH FLOORS, WALLS, CEILINGS AND ROOFS WHERE PLUMBING COMPONENTS ARE REMOVED AND WHERE INSTALLATION. REPAIR SURFACES TO MATCH ADJACENT AREAS.
- 7. INSTALL PERMANENT CAPS WHERE PIPING IS REMOVED AND THE EXISTING TAPS ARE NOT USED FOR THE NEW INSTALLATION. INSTALL TEMPORARY CAPS WHERE PIPING IS REMOVED AND THE EXISTING TAPS WILL BE USED FOR THE NEW INSTALLATION TO PROTECT THE
- REMOVE PIPE HANGERS, PIPE SUPPORTS AND EQUIPMENT SUPPORTS WHERE PIPING OR EQUIPMENT IS REMOVED AND THE EXISTING HANGERS AND SUPPORTS ARE NOT USED FOR THE NEW INSTALLATION.
- VERIFY THAT EXISTING EQUIPMENT TO REMAIN IS OPERATING PROPERLY. NOTIFY THE ARCHITECT, ENGINEER AND/OR OWNER OF
- REQUIRED DURING DEMOLITION PHASE OF WORK IN PREPARATION FOR NEW TIE-IN PHASE OF WORK, COORDINATE WITH THE OWNER AND MINIMIZE DOWNTIME VERIEV EXISTING SYSTEMS FOURPMENT AND COMPONENTS WILL BE PROVIDED WITH BACKUP SERVICE WHERE REQUIRED. NOTIFY OWNER A MINIMUM OF SEVEN (7) DAYS PRIOR TO







PANELBOARD: HG (ETR)

AIC RATING: CONTRACTOR TO VERIFY & NOTIFY EOR MOUNTING: SURFACE

LOCATION: ELECTRICAL G105 VOLTAMPS/PHASE WIRE BKR P P BKR WIRE VOLTAMPS/PHASE DESCRIPTION A B C NO. AMP A B C AMP NO. 3,546 EX 20 1 1 20 EX 3.546 3.546 3.546 3,546 3,546 7.091 3,546 7,091 3,546 3,546 3.546 3.324 4.210 EX 17 SPRINKLER BOOSTER PUMP 3,324 3.324 4.210 10.637 10,637 10.637 1 1 SUBTOTAL 18,393 14,847 14,847 24,599 21,053 21,053 TOTAL PHASE A - VA 42,992 CONN. VA DF LOAD CONN. VA | DF | |LOAD REFRIG 155 COOLING 1.00 AMPS HEATING 0 SIGNAGE TOTAL PHASE B - VA 35,900 LIGHTING 1.25 KITCHEN AMPS 130 35,460 TOTAL PHASE C - VA 35,900 RECEPTACLES [1.0/.5 EXISTING [1.00 AMPS 130 MOTORS 16,298 LRG MTR: 5HP 6,305 1.25 SUPP HEAT 31,911 1.00 SHOW WND [W] TOTAL PNLBD - VA 114,793 MISC EQUIP 24,819 1.00 LTG TRACK AMPS 138

PER THE NATIONAL ELECTRICAL CODE, SECTION 220.87, PROVIDE A CONTINUOUS POWER METER RECORDING OF THE MAXIMUM DEMAND (MEASURE OF AVERAGE POWER DEMAND OVER A 15-MINUTE INTERVAL) CONTINUOUSLY RECORDED OVER A MINIMUM 30-DAY PERIOD ON EACH PHASE OF THE FEEDER. RECORDING SHALL BEGIN IMMEDIATELY AFTER AWARDED CONTRACT AND PRIOR TO DEMOLITION OF ANY EXISTING LOADS AND WHILE OCCUPIED. RECORDING SHALL REFLECT THE MAXIMUM DEMAND OF THE FEEDER WHILE BUILDING/SPACE IS OCCUPIED AND SHALL INCLUDE (BE MEASUREMENT OR CALCULATION) THE LARGER OF THE HEATING OR COOLING EQUIPMENT LOAD, AND ANY OTHER LOADS THAT MAY BE PERIODIC IN NATURE DUE TO SEASONAL OR SIMILAR CONDITIONS. PROVIDE A WRITTEN REPORT OF DEMAND VALUES TO ENGINEER FOR REVIEW IMMEDIATELY UPON COMPLETION OF RECORDING SESSION. EXISTING LOAD WILL HAVE TO BE EVALUATED TO DETERMINE IF FURTHER WORK WILL BE REQUIRED PRIOR TO CONNECTING OR ENERGIZING NEW LOADS.



LINE-SIDE LUGS: MECHANICAL EQUIPMENT GROUND BUS DESCRIPTION 2 E 4 EX 3,546 6 EX ANSFORMER XCG 10 E 091 4,210 SEWAGE EJECTOR (2 @ 5HP) FD SPAC IPPED SPACE PED SPAC PPED SPACE PED SPAC PPED SPACE PED SPACE PPED SPAC PPED SPACE

PED SPACE

PED SPACE

SUBTOTAL

TOTAL DEMAND

125.234 V/

V1.01

PANELBOARD LEGEND

ARC FAULT CIRCUIT INTERRUPTER.

1 25

1.00

1.00

- CIRCUIT VIA CURRENT LIMITING DEVICE.
- DISCONNECT CIRCUITRY FOR REMOVED LOAD, UPDATE CIRCUIT DIRECTORY TO EMERGENCY LIGHTING HANDLE-ON CLAMP.
- FUTURE LOAD; NOTE AS SPARE AND TURN OFF.
- GROUND-FAULT CIRCUIT INTERRUPTER TYPE CIRCUIT BREAKER (5 mA). GROUND FAULT EQUIPMENT PROTECTION BREAKER (30 mA).
- PROVIDE HANDLE-TIE FOR MULTI-WIRE BRANCH CIRCUIT PER CODE.
- LIGHTING CONTROL SCHEME NUMBER HANDLE PADLOCKABLE-OFF DEVICE.
- PROVIDE NEW CIRCUIT BREAKER.
- POWER-SWITCHING CIRCUIT BREAKER. EMERGENCY POWER-SWITCHING CIRCUIT BREAKER
- REUSE EXISTING CIRCUIT BREAKER FOR NEW/REVISED LOAD.
- SHUNT TRIP CIRCUIT BREAKER.
- VERIFY EXISTING LOAD AND UPDATE DIRECTORY, IF UNUSED, NOTE AS SPARE BRANCH CIRCUITRY HAS BEEN UPSIZED TO REDUCE VOLTAGE DROP. ADJUST
- GROUND WIRE SIZE PER CODE. PROVIDE LUG ADAPTORS IF REQUIRED. CORRECT/REPAIR EXISTING HAZARD TO MAKE CODE COMPLIANT INSTALLATION.

ELECTRICAL SYMBOLS

HOMERUN TO PANELBOARD. INFORMATION AT ARROWS ARE CIRCUIT NUMBERS AND PANELBOARD FOR TERMINATION. REFER TO PANELBOARD SCHEDULES FOR BRANCH CIRCUIT CONDUCTOR SIZES.

CIRCUIT CONTINUATION OR PARTIAL CIRCUIT

CONDUIT CONCEALED

- CONDUIT CONCEALED (EMERGENCY)
- \leq _ \geq conduit in/under floor/ground construction
- LOW VOLTAGE CABLE (NOT ROUTED IN CONDUIT)
- CONNECTION POINT OR EQUIPMENT TERMINATION

EQUIPMENT TERMINATION

ELECTRICAL DEMOLITION GENERAL NOTES:

- 1. AVOID DAMAGING FACILITIES, INCLUDING EQUIPMENT, LIGHT FIXTURES AND DEVICES THAT ARE EXISTING TO REMAIN. REPAIR ALL DAMAGE CAUSED DURING WORK AT NO EXTRA COST TO THE OWNER.
- 2. DISPOSE OF ALL ELECTRICAL EQUIPMENT AND DEVICES SHOWN TO BE REMOVED, UNLESS NOTED OTHERWISE.
- WHERE DEMOLITION WORK INTERRUPTS ELECTRICAL CONTINUITY OF CIRCUITS THAT ARE TO REMAIN TO USE, PROVIDE NECESSARY DEVICES AND RELATED CIRCUITRY TO MAINTAIN ELECTRICAL CONTINUITY IN ACCORDANCE WITH OWNER REQUIREMENTS. RECIRCUIT REUSED ELECTRICAL EQUIPMENT PREVIOUSLY POWERED FROM DEMOLISHED EQUIPMENT TO NEW OR TEMPORARY EQUIPMENT AS NEEDED

APPLICABLE ELECTRICAL CODES

- NOTE: PROJECT IS DESIGNED IN COMPLIANCE WITH THE FOLLOWING CODES. THIS IS NOT AN EXHAUSTIVE LIST. PROJECT SHALL COMPLY WITH ALL APPLICABLE CODES, STANDARDS AND LOCAL REQUIREMENTS. REFER TO THE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
- ELECTRICAL CODE: 2017 NATIONAL ELECTRICAL CODE, (NFPA 70) BUILDING CODE: 2018 INTERNATIONAL BUILDING CODE

ELECTRICAL GENERAL NOTES:

- 1. EXISTING CONDITIONS WERE TAKEN FROM SITE VISITS AND MAY NOT REFLECT ACTUAL "AS-BUILT" CONDITIONS. VERIFY EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BID. COORDINATE NEW AND DEMOLITION WORK WITH ALL OTHER TRADES AND EXISTING CONDITIONS.
- 2. NOTIFY ENGINEER AND OWNER, AS APPLICABLE, IF ANY DANGEROUS CONDITIONS EXIST ON JOB SITE BEFORE ANY DEMOLITION WORK BEGINS.
- 3. COORDINATE ANY NECESSARY POWER OUTAGES WITH THE OWNER AND MAKE EVERY ATTEMPT TO SCHEDULE DURING NON-SCHOOL OR OFF-PEAK SCHOOL HOURS TO MINIMIZE DISRUPTION TO SCHOOL OPERATIONS.

ELECTRICAL SUPPLEMENTAL SPECIFICATIONS

- PRIOR TO SUBMITTING BID, VISIT THE JOB SITE AND BECOME FULLY ACQUAINTED WITH THE EXISTING CONDITIONS. AS APPLICABLE, GENERAL NOTES, OTHER TRADE DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS THAT MAY NOT BE CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS. NOTIFY ENGINEER OF ANY CONFLICTS OR DISCREPANCIES PRIOR TO SUBMITTING BID.
- ALL WORK SHALL CONFORM TO ALL LOCAL CODES AND ORDINANCES AS WELL AS APPLICABLE INDUSTRY STANDARDS. ALL EQUIPMENT SHALL BEAR LABELS FOR THE USE INTENDED BY AN AHJ ACCEPTED NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL), SUCH AS UL OR ETL. THE FINAL ELECTRICAL INSTALLATION OF THE FACILITY OCCUPIED BY OWNER SHALL BE FREE FROM ELECTRICAL DEFECTS TO THE SATISFACTION OF THE AHJ, OWNER, ARCHITECT AND ENGINEER.
- ELECTRICAL DRAWINGS ARE DIAGRAMMATIC/SCHEMATIC IN NATURE AND REPRESENT THE GENERAL SCOPE OF WORK. IT IS NOT WITHIN THE SCOPE OF THE ELECTRICAL DRAWINGS TO SHOW ALL NECESSARY RACEWAY ROUTING, BENDS, OFFSETS, PULL BOXES AND OBSTRUCTIONS. CONTRACTOR SHALL COORDINATE THE FINAL LOCATION OF EQUIPMENT AND WIRING DEVICES WITH OTHER TRADES PRIOR TO INSTALLATION.
- PROVIDE PROPER FIRE PROOFING AND SEALANT FOR PENETRATIONS THROUGH FIRE RATED ASSEMBLIES. THE FIRE STOPPING METHOD, MATERIAL AND ITS APPLICATION SHALL BE NRTL LISTED, CODE COMPLIANT AND APPROVED BY AHJ.
- ALL EMPTY CONDUIT/RACEWAY SHALL BE INSTALLED WITH PULL STRINGS. TERMINATE CONDUIT STUB-UP WITH A NYLON BUSHING.
- EXPOSED CONDUIT/RACEWAY SHALL BE PAINTED TO MATCH ADJACENT SURFACE, UNLESS NOTED OTHERWISE. COORDINATE REQUIREMENTS WITH ARCHITECT AND OWNER PRIOR TO INSTALLATION.
- WHERE PRACTICABLE, ALL UNDER-FLOOR/UNDER-GROUND CONDUITS/RACEWAY SHALL BE INSTALLED A MINIMUM OF 24" BELOW BOTTOM OF SLAB/PAVING/GRADE, UNLESS NOTED OTHERWISE. NOTE: THE DESIGN INTENT FOR INSTALLING ELECTRICAL CIRCUITRY AT THIS DEPTH IS TO PROTECT THE ELECTRICAL CIRCUITRY FROM DAMAGE DUE TO FUTURE WORK
- PROVIDE INSULATED EQUIPMENT GROUNDING CONDUCTOR FOR ALL CIRCUITS, UNLESS NOTED OTHERWISE.

HENDERSON

8345 LENEXA DRIVE, SUITE 300 LENEXA, KS 66214 TEL 913.742.5000 FAX 913.742.5001 WWW.HENDERSONENGINEERS.COM 2350001275 MO. CORPORATE NUMBER: E-556D 10/31/24

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\leq Õ OT M m DOUGLAS EVERHART NUMBER PE-201900764 DOUGLAS M. EVERHAR LICENSE # PE-2019007648 PROFESSIONAL SEAL REVISIONS JOB NO: 2150003132 DATE: 09.14.2023 CHECKED BY: BB/DP DRAWN BY: AE/NS ELECTRICAL PLAN **EO.0**1